A

COMMERCIAL PILOT QUESTION BOOK

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1986

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COMMERCIAL PILOT

AIRPLANE
ROTORCRAFT-HELICOPTER
ROTORCRAFT-GYROPLANE
LIGHTER-THAN-AIR HOT-AIR BALLOON
LIGHTER-THAN-AIR GAS BALLOON
LIGHTER-THAN-AIR AIRSHIP
GLIDER
MILITARY COMPETENCE

QUESTION BOOK

1986

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Aviation Standards National Field Office

READEX FICHE

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402

MAXIMUM TIME ALLOWED FOR TEST:

Commercial Pilot	—	Airplane:	5 Hours
	—	Rotorcraft (Helicopter):	5 Hours
	—	(All Others):	4 Hours

Materials to be used with this question book when used for airman testing:

1. Airman Written Test Application which includes the answer sheet.
2. Question Selection Sheet which identifies the questions to be answered.
3. Plastic overlay sheet which can be placed over performance charts for plotting purposes.

GENERAL INSTRUCTIONS FOR TAKING THE TEST

1. Read the instructions on page 1 of the Airman Written Test Application and complete page 4 of the form.

2. The question numbers in this question book are numbered consecutively beginning with No. 2001. Refer to the question selection sheet to determine which questions to answer.

3. For each item on the answer sheet, find the appropriate question in the book.

4. Mark your answer in the space provided for that item on the answer sheet.

5. Remember:

   Read each question carefully and avoid hasty assumptions. Do not answer until you understand the question. Do not spend too much time on any one question. Answer all of the questions that you readily know and then reconsider those you find difficult. Be careful to make necessary conversions when working with temperatures, speeds, and distances.

If a regulation or operations procedure is changed after this question book is printed, you will receive credit until the affected questions are revised.

THE MINIMUM PASSING GRADE IS 70.

WARNING

§ 61.37 Written tests: cheating or other unauthorized conduct.

(a) Except as authorized by the Administrator, no person may—

(1) Copy, or intentionally remove, a written test under this Part;

(2) Give to another, or receive from another, any part of copy of that test;

(3) Give help on that test to, or receive help on that test from, any person during the period that test is being given;

(4) Take any part of that test in behalf of another person;

(5) Use any material or aid during the period that test is being given; or

(6) Intentionally cause, assist, or participate in any act prohibited by this paragraph.

(b) No person whom the Administrator finds to have committed an act prohibited by paragraph (a) of this section is eligible for any airman or ground instructor certificate or rating, or to take any test therefor, under this chapter for a period of one year after the date of that act. In addition, the commission of that act is a basis for suspending or revoking any airman or ground instructor certificate or rating held by that person.

PREFACE

This book was developed by the Federal Aviation Administration to be used by Federal Aviation Administration testing centers and Federal Aviation Administration designated written test examiners when administering Commercial Pilot Written Tests. It is also used to administer Regulations Test For Military Pilots (Private and Commercial).

Commercial pilot applicants may use this book as a study guide. It is issued as FAA–T–8080–2A, Commercial Pilot Question Book, and is available from:

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Or from U.S. Government Printing Office Bookstores located in major cities throughout the U.S.

The questions included in this publication are predicated on regulations, principles, and practices that were valid at the time of publication. The question selection sheets prepared for use with this question book are security items and are revised at frequent intervals.

The Federal Aviation Administration does not supply the correct answers to questions included in this book. Students should determine the answers by research and study, by working with instructors, or by attending ground schools. The Federal Aviation Administration is NOT responsible for either the content of commercial reprints of this book or the accuracy of the answers they may list.

Comments regarding this publication should be directed to:

U.S. Department of Transportation
Federal Aviation Administration
Aviation Standards National Field Office
Examinations Standards Branch, AVN–130
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Oklahoma City, Oklahoma 73125

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INTRODUCTION

This book follows the new concept in presenting Federal Aviation Administration written tests to commercial pilot applicants. It contains questions appropriate to every aircraft category for which a Commercial Pilot Certificate is authorized. Question selection sheets are used to administer the proper written test to each applicant. Each test is constructed from the 1,200 questions included in Appendix 1.

The planned revision cycle is 24 months for the question book and 12 months for the associated question selection sheets. Each question book and selection sheet is dated to indicate its expiration date.

THE WRITTEN TEST

Questions and Scoring

The test questions are of the multiple-choice type. Answers to questions listed on the question selection sheet should be marked on the answer sheet of AC Form 8080-3, Airman Written Test Application. Directions should be read carefully before beginning the test. Incomplete or erroneous personal information entered on this form delays the scoring process.

The answer sheet is sent to the Mike Monroney Aeronautical Center in Oklahoma City where it is scored by computer. Shortly thereafter AC Form 8080-2, Airman Written Test Report, is sent to the applicant listing the score and test questions missed.

When reporting for a flight test, the applicant must present this form and be prepared to discuss those questions missed. This form must also be presented when retesting is required in the event of a written test failure.

Taking the Test

The test may be taken at Federal Aviation Administration testing centers, Federal Aviation Administration written test examiner's facilities, or other designated places. After completing the test, the applicant must surrender the issued question book, question selection sheet, answer sheet, and any papers used for computations or notations, to the monitor before leaving the test room.

When taking the test, the applicant should keep the following points in mind:

1. Answer each question in accordance with the latest regulations and procedures.
2. Read each question carefully before looking at the possible answers. You should clearly understand the problem before attempting to solve it.
3. After formulating an answer, determine which of the alternatives most nearly corresponds with that answer. The answer chosen should completely resolve the problem.
4. From the answers given, it may appear that there is more than one possible answer; however, there is only one answer that is correct and complete. The other answers are either incomplete or are derived from popular misconceptions.
5. If a certain question is difficult for you, it is best to proceed to other questions. After the less difficult questions have been answered, return to those which gave you difficulty. Be sure to indicate on the question selection sheet the questions to which you wish to return.
6. When solving a computer problem, select the answer nearest your solution. The problem has been checked with various types of computers; therefore, if you have solved it correctly, your answer will be closer to the correct answer than to any of the other choices.
7. To aid in scoring, enter personal data in the appropriate spaces on the test answer sheet in a complete and legible manner. Enter the test number printed on the question selection sheet.

Retesting—FAR 61.49

Applicants who receive a failing grade may apply for retesting by presenting their AC Form 8080-2, Airman Written Test Report—

(1) after 30 days from the date the applicant failed the test; or
(2) in case of the first failure, the applicant may apply for retesting before the 30 days have expired upon presenting a written statement from an authorized instructor certifying that the instructor has given ground instruction to the applicant and finds the applicant competent to pass the test.

NOTE: Blank spaces appear on several pages of this publication. This permits referenced figures and tables to appear as close as possible to their related questions.

APPENDIX 1

2001. Name the four flight fundamentals involved in maneuvering an aircraft.

1—Aircraft power, pitch, bank, and trim.
2—Straight-and-level flight, turns, climbs, and descents.
3—Takeoffs, slow flight, fast flight, and stalls.
4—Starting taxiing, takeoff, and landing.

2002. The ratio between the total airload imposed on the wing and the gross weight of an airplane in flight is known as the

1—load factor.
2—power loading.
3—aspect ratio.
4—yield load.

2003. If a load factor of 3 G's is placed on an airplane with a gross weight of 3,000 pounds, the total load on the airplane's structure would be

1—1,000 pounds.
2—3,000 pounds.
3—6,000 pounds.
4—9,000 pounds.

2004. Load factor is the lift generated by the wings of an airplane at any given time

1—multiplied by the total weight of the airplane.
2—divided by the total weight of the airplane.
3—subtracted from the total weight of the airplane.
4—added to the empty weight of the airplane.

2005. Under the category system, the design load factor for airplanes in the normal category is

1—5.7 G's.
2—4.4 G's.
3—3.8 G's.
4—6.6 G's.

2006. For a given angle of bank, the load factor imposed on both the airplane and pilot in a coordinated constant-altitude turn

1—is constant.
2—is directly related to the airplane's gross weight.
3—increases at a very slow rate beyond 45° of bank.
4—varies with the rate of turn.

2007. The degree of airplane wing loading during a level coordinated turn in smooth air depends upon the

1—density altitude.
2—rate of turn.
3—angle of bank.
4—true airspeed.

2008. If the angle of bank were held constant and airspeed varied, the load factor would

1—vary depending on the rate of turn.
2—increase when speed increases.
3—decrease when speed decreases.
4—remain constant.

2009. If an airplane with a gross weight of 2,000 pounds were subjected to a total load of 6,000 pounds in flight, the load factor would be

1—2 G's.
2—3 G's.
3—9 G's.
4—12 G's.

2010. A rectangular wing, as compared to other wing planforms, has a tendency to stall first at the

1—wing root providing adequate stall warning.
2—wingtip providing adequate stall warning.
3—wing root providing inadequate stall warning.
4—wingtip providing inadequate stall warning.

2011. The primary purpose of wing spoilers is to

1—change the camber or curvature of the wing.
2—decrease landing speed.
3—decrease the lift of the wing.
4—increase the drag.

2012. By changing the angle of attack of a wing, the pilot can control the airplane's

1—lift, gross weight, and drag.
2—lift, airspeed, and drag.
3—airspeed, weight, and drag.
4—lift and airspeed, but not drag.

2013. The angle of attack of a wing directly controls the

1—amount of airflow above and below the wing.
2—point at which the CG is located.
3—distribution of positive and negative pressure acting on the wing.
4—angle of incidence of the wing.

2014. When the angle of attack of a symmetrical airfoil is increased, the center of.pressure will

1—remain unaffected.
2—move forward.
3—move aft.
4—move erratically.

2015. If the angle of attack and other factors remain constant and the airspeed is doubled, the lift produced at the higher speed will be

1—the same as at the lower speed.
2—two times greater than at the lower speed.
3—three times greater than at the lower speed.
4—four times greater than at the lower speed.

2016. An airplane wing is designed to produce lift resulting from relatively

1—positive air pressure below and above the wing's surface.
2—negative air pressure below the wing's surface and positive air pressure above the wing's surface.
3—positive air pressure below the wing's surface and negative air pressure above the wing's surface.
4—negative air pressure below and above the wing's surface.

2017. Lift on a wing is most properly defined as the

1—differential pressure acting perpendicular to the chord of the wing.
2—force produced perpendicular to the relative wind.
3—reduced pressure resulting from a smooth flow of air over a curved surface and acting perpendicular to the mean surface.
4—force produced perpendicular to the longitudinal axis.

2018. On a wing, the force of lift acts perpendicular to and the force of drag acts parallel to the

1—chordline.
2—longitudinal axis.
3—flightpath.
4—lateral axis.

2019. In steady-state flight the sum of the opposing forces acting on an airplane is equal to

1—the total weight of the airplane.
2—the total weight of the airplane plus the total drag.
3—zero.
4—the thrust plus total lift.

2020. Which statement is true, if during a level coordinated turn the load factor was kept constant?

1—An increase in airspeed results in the same radius.
2—An increase in airspeed results in a decrease in radius.
3—An increase in airspeed results in an increase in radius.
4—A decrease in airspeed results in an increase in radius.

2021. While holding the angle of bank constant, if the rate of turn is varied the load factor would

1—remain constant.
2—vary depending upon speed.
3—vary depending upon weight.
4—increase if speed were increased.

2022. In coordinated flight for any specific bank, the faster the speed of the airplane the

1—smaller the radius and the slower the rate of turn.
2—greater the radius and the faster the rate of turn.
3—smaller the radius and the faster the rate of turn.
4—greater the radius and the slower the rate of turn.

2023. To increase the rate of turn and at the same time decrease the radius, a pilot should

1—shallow the bank and decrease airspeed.
2—steepen the bank and increase airspeed.
3—shallow the bank and increase airspeed.
4—steepen the bank and decrease airspeed.

2024. Which statement is correct with respect to rate and radius of turn for an airplane flown in a coordinated turn at a constant altitude?

1—For any specific angle of bank and airspeed, the lighter the airplane the faster the rate and the smaller the radius of turn.
2—For a specific angle of bank and airspeed, the rate and radius of turn will not vary.
3—The faster the true airspeed, the faster the rate and larger the radius of turn regardless of the angle of bank.
4—To maintain a steady rate of turn, the angle of bank must be increased as the airspeed is decreased.

2025. While maintaining a constant angle of bank and altitude in a coordinated turn, an increase in airspeed will

1—decrease the rate of turn resulting in a decreased load factor.
2—decrease the rate of turn resulting in no change in load factor.
3—increase the rate of turn resulting in an increased load factor.
4—increase the rate of turn resulting in a decreased load factor.

2026. Why is it necessary to increase back elevator pressure to maintain altitude during a medium to steep banked turn?

1—The rudder's function has been transferred to the elevator as the bank approaches 45°.
2—To keep the airplane's nose moving in the direction of the turn.
3—To compensate for the loss of the vertical component of lift.
4—To compensate for the effect of drag caused by deflection of the ailerons.

2027. To maintain altitude during a turn, the angle of attack must be increased to compensate for the decrease in the

1—airplane drag.
2—wing loading.
3—horizontal component of lift.
4—vertical component of lift.

2028. If airspeed is increased during a level turn, what action would be necessary to maintain altitude?

1—The angle of attack and angle of bank must be increased.
2—The angle of attack must be decreased or angle of bank increased.
3—The angle of attack must be increased or angle of bank decreased.
4—The angle of attack and angle of bank must be decreased.

2029. Maneuvering the airplane is generally divided into four flight fundamentals which are

1—starting, taxiing, takeoff, and landing.
2—airplane power, pitch, bank, and trim.
3—takeoff, normal flight, slow flight, and stalls.
4—straight-and-level flight, turns, climbs, and descents.

2030. Indicated stall speed is affected by

1—angle of attack, weight, and air density.
2—weight, load factor, and power.
3—weight, density altitude, power, and turbulence.
4—load factor, angle of attack, and power.

2031. The indicated stalling speed of an airplane is most affected by

1—changes in air temperature.
2—changes in air density.
3—variations in flight altitude.
4—variations in airplane loading.

2032. Which is true regarding the stall speed of airplanes?

1—A low speed is necessary to produce a stall.
2—The stall speed of a given airplane is not a fixed value.
3—The stall speed of a given airplane is the same regardless of the flight maneuver.
4—A given airplane's stall speed is the same regardless of the angle of attack.

2033. Stall recovery becomes progressively more difficult if the CG is located farther

1—forward in light airplanes only.
2—aft in any airplane.
3—aft in light airplanes only.
4—forward in any airplane.

2034. As the CG location is changed, recovery from stalls becomes progressively

1—less difficult as the CG moves rearward.
2—more difficult as the CG moves forward.
3—less difficult as the CG moves either forward or rearward.
4—more difficult as the CG moves rearward.

2035. The angle of attack at which a wing stalls remains constant regardless of

1—weight, dynamic pressure, bank angle, or pitch attitude.
2—dynamic pressure, but varies with weight, bank angle, and pitch attitude.
3—weight and pitch attitude, but varies with dynamic pressure and bank angle.
4—dynamic pressure and pitch attitude, but varies with weight and bank angle.

2036. Turbulent air can cause an increase in stalling speed when there is

1—a decrease in angle of attack.
2—a sudden decrease in load factor.
3—an abrupt increase in true airspeed.
4—an abrupt change in relative wind.

2037. In light airplanes, normal recovery from spins may become difficult if the

1—airspeed becomes too great.
2—CG is too far forward.
3—spin is entered too rapidly.
4—CG is too far rearward.

2038. In a certificated airplane, uncontrollable spins are most likely to develop from normal spins if the

1—rudders and ailerons are cross controlled.
2—gross weight is exceeded.
3—most rearward CG position is exceeded.
4—minmum allowable load is exceeded.

2039. If an airplane is loaded to the rear of its CG range, it will tend to be

1—unstable about its lateral axis.
2—sluggish in aileron control.
3—unstable about its longitudinal axis.
4—sluggish in rudder control.

2040. With comparable conditions relative to temperature, wind, and airplane weight, the groundspeed at touchdown at high elevation airports will be

1—higher than sea level.
2—lower than sea level.
3—the same as sea level.
4—either higher or lower than sea level, depending on airspeed corrections applied.

2041. An airplane leaving ground effect will

1—require a lower angle of attack to maintain the same lift coefficient.
2—experience an increase in induced drag and require more thrust.
3—display more stability and a nosedown change in moment.
4—produce more static source pressure and a higher indicated airspeed.

2042. What preparation should a pilot make to adapt the eyes for night flying?

1—Wear sunglasses after sunset until ready for flight.
2—Avoid red lights at least 30 minutes before the flight.
3—Wear amber colored glasses at least 30 minutes before the flight.
4—Avoid bright white lights at least 30 minutes before the flight.

2043. If the same angle of attack is maintained in ground effect as when out of ground effect, lift will

1—increase, and induced drag will decrease.
2—decrease, and parasite drag will increase.
3—increase, and induced drag will increase.
4—decrease, and parasite drag will decrease.

2044. What performance is characteristic of flight at maximum L/D in a propeller-driven airplane?

1—Maximum endurance.
2—Best angle of climb.
3—Maximum coefficient of lift and minimum coefficient of drag.
4—Maximum range and maximum distance glide.

2045. Refer to Figure 1. If an airplane glides at an angle of attack of 10°, how much altitude will it lose in 1 mile?

1—240 feet.
2—480 feet.
3—960 feet.
4—1,920 feet.

2046. Refer to Figure 1. How much altitude will this airplane lose in 3 miles of gliding at an angle of attack of 8°?

1—220 feet.
2—440 feet.
3—880 feet.
4—1,320 feet.

2047. Refer to Figure 1. The L/D at a 2° angle of attack is approximately the same as the L/D for

1—9.75° angle of attack.
2—10.5° angle of attack.
3—16.5° angle of attack.
4—19.0° angle of attack.

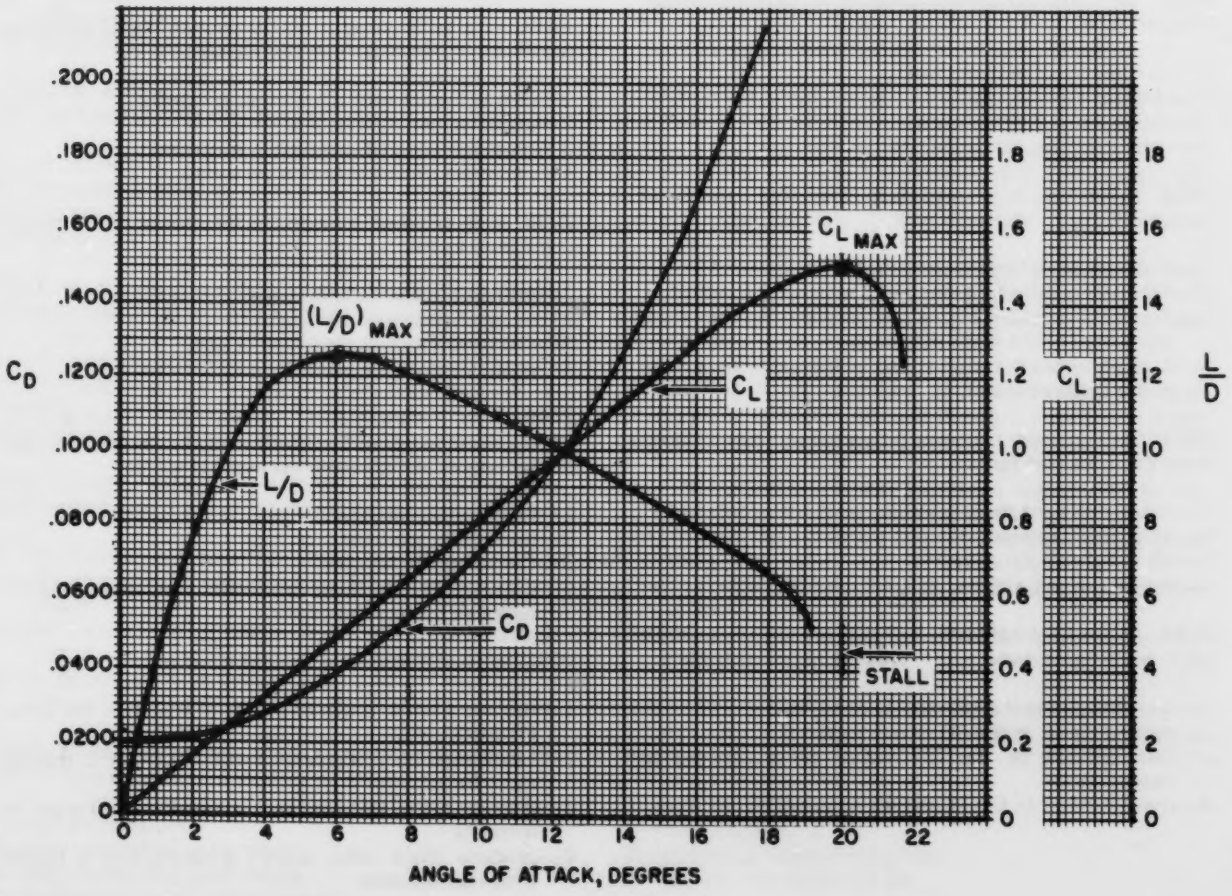


Figure 1

2048. Which is true regarding the forces acting on an aircraft in a steady–state descent?

1—The sum of all upward forces is less than the sum of all downward forces.
2—The sum of all rearward forces is greater than the sum of all forward forces.
3—The sum of all forward forces is equal to the sum of all rearward forces.
4—The sum of all upward forces is greater than the sum of all downward forces.

2049. Which is true regarding the force of lift in steady, unaccelerated flight?

1—An airfoil will always stall at the same indicated airspeed; therefore, an increase in weight will require an increase in speed to generate sufficient lift to maintain altitude.
2—At lower airspeeds the angle of attack must be less to generate sufficient lift to maintain altitude.
3—At higher airspeeds the angle of attack must be greater to generate sufficient lift to maintain altitude.
4—There is a corresponding indicated airspeed required for every angle of attack to generate sufficient lift to maintain altitude.

2050. During the transition from straight–and–level flight to a climb, the angle of attack is

1—increased but lift remains the same.
2—increased but lift is decreased.
3—decreased but lift is increased.
4—increased and lift is momentarily increased.

2051. If the airspeed of an airplane is doubled while in level flight, parasite drag will

1—remain the same.
2—decrease as airspeed increases.
3—double.
4—be four times greater.

2052. As airspeed increases in level flight above maximum L/D speed, total drag of an airplane

1—decreases due to decreased induced drag.
2—increases due to increased induced drag.
3—decreases due to decreased parasite drag.
4—increases due to increased parasite drag.

2053. As airspeed decreases in level flight below that speed for maximum L/D, total drag of an airplane

1—increases because of increased induced drag.
2—increases because of increased parasite drag.
3—decreases because of lower induced drag.
4—decreases because of lower parasite drag.

2054. Select the true statement concerning the effect on stall speeds when operating with the gear and flaps up and with the gear and flaps down. (See Figure 2.)

1—In a 45° bank with power on, the stall occurs at a higher airspeed with gear and flaps down than with gear and flaps up.
2—In power–off turns, regardless of the gear and flaps position, the stall will occur at an airspeed 7 – 8 MPH higher with 45° of bank than with 30° of bank.
3—In level flight with power off, a stall would occur at a higher airspeed with gear and flaps down than with gear and flaps up.
4—In a 60° bank with power on or power off, the airplane will stall at a lower airspeed with gear and flaps up than with gear and flaps down.

2055. Select the true statement concerning the effect on stall speeds when operating with the gear and flaps up and with the gear and flaps down. (See Figure 2.)

1—In a 60° bank with power on or power off, the airplane will stall at a lower airspeed with gear and flaps up than with gear and flaps down.
2—In level flight with power off, a stall would occur at a higher airspeed with gear and flaps down than with gear and flaps up.
3—In power–on turns, regardless of the gear and flaps position, the stall will occur at an airspeed 6 – 7 MPH higher with 45° of bank than with 30° of bank.
4—In a 30° bank with power on, the stall occurs at a higher airspeed with gear and flaps down than with gear and flaps up.

STALL SPEEDS

GROSS WEIGHT 2750 LBS		ANGLE OF BANK			
		LEVEL	30°	45°	60°
POWER		GEAR AND FLAPS UP			
ON	MPH	62	67	74	88
	KTS	54	58	64	76
OFF	MPH	75	81	89	106
	KTS	65	70	77	92
		GEAR AND FLAPS DOWN			
ON	MPH	54	58	64	76
	KTS	47	50	56	66
OFF	MPH	66	71	78	93
	KTS	57	62	68	81

Figure 2

2056. Which statement is true relative to changing angle of attack?

1—A decrease in angle of attack will increase impact pressure below the wing, and decrease drag.
2—An increase in angle of attack will decrease impact pressure below the wing, and increase drag.
3—An increase in angle of attack will increase impact pressure below the wing, and increase drag.
4—An increase in angle of attack will increase impact pressure below the wing, and decrease drag.

2057. To generate the same amount of lift as altitude is increased, an airplane must be flown at

1—a lower true airspeed for any given angle of attack.
2—the same true airspeed regardless of angle of attack.
3—a lower true airspeed and a greater angle of attack.
4—a higher true airspeed for any given angle of attack.

2058. Refer to Figure 3. What increase in load factor would take place if the angle of bank were increased from 60° to 80°?

1—1 G.
2—2 G's.
3—3 G's.
4—4 G's.

2059. Refer to Figure 3. What increase in load factor would take place if the angle of bank were increased from 60° to 70°?

1—0.5 G.
2—0.8 G.
3—1.5 G's.
4—2.0 G's.

2060. Refer to Figure 3. What is the stall speed of an airplane under a load factor of 2 G's if the unaccelerated stall speed is 60 knots.?

1—66 knots.
2—74 knots.
3—84 knots.
4—102 knots.

2061. Refer to Figure 3. What is the stall speed of an airplane under a load factor of 4 G's if the unaccelerated stall speed is 70 knots.?

1—91 knots.
2—116 knots.
3—132 knots.
4—140 knots.

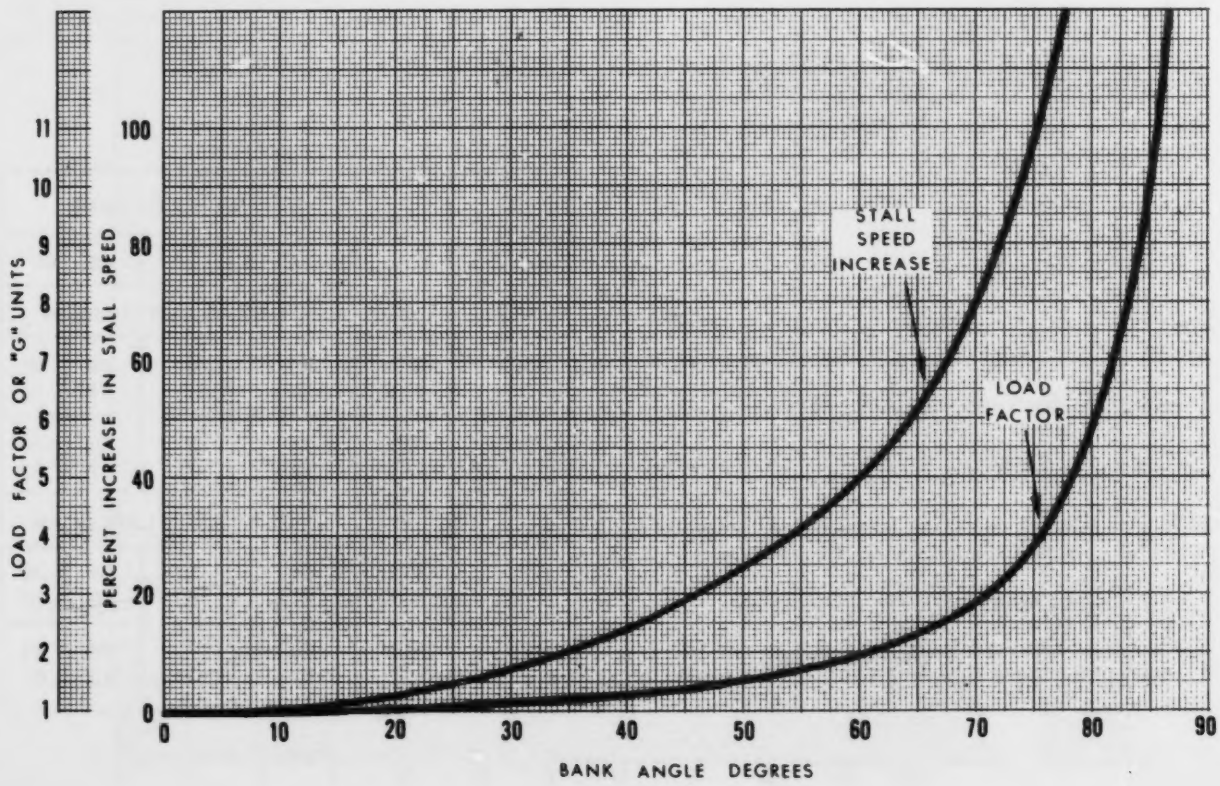


Figure 3

2062. To produce the same lift while in ground effect as when out of ground effect, the airplane requires

1—greater thrust and the same angle of attack.
2—the same angle of attack.
3—a greater angle of attack.
4—a lower angle of attack.

2063. One of the main functions of flaps during the approach and landing is to

1—decrease the angle of descent without increasing the airspeed.
2—permit a touchdown at a higher indicated airspeed.
3—increase the angle of descent without increasing airspeed.
4—decrease lift, thus enabling a steeper-than-normal approach to be made.

2064. Which is true regarding the use of flaps during turns?

1—Using a constant flap setting and varying the bank has no effect on stall speed.
2—The addition of flaps increases the stall speed.
3—The addition of flaps decreases the stall speed.
4—In any given degree of bank, the addition of flaps has no effect on stall speed.

2065. As the angle of bank is increased, the vertical component of lift

1—decreases and the sink rate increases.
2—increases and the sink rate decreases.
3—decreases and the sink rate decreases.
4—increases and the sink rate increases.

2066. If the airspeed is increased from 90 MPH to 135 MPH during a level 60° banked turn, the load factor will

1—remain the same but the radius of the turn will decrease.
2—increase due to additional centrifugal force.
3—decrease and the radius of turn will increase.
4—remain the same but the radius of turn will increase.

2067. Baggage weighing 90 pounds is placed in a normal category airplane's baggage compartment which is placarded at 100 pounds. If this airplane is subjected to a positive load factor of 3.5 G's, the total load of the baggage would be

1—315 pounds and would be excessive.
2—315 pounds and would not be excessive.
3—350 pounds and would not be excessive.
4—350 pounds and would be excessive.

2068. If a standard rate turn is maintained, how long would it take to turn 360°?

1—1 minute.
2—2 minutes.
3—3 minutes.
4—4 minutes.

2069. If a standard rate turn is maintained, how much time would be required to turn to the right from a heading of 090° to a heading of 270°?

1—1 minute.
2—2 minutes.
3—3 minutes.
4—4 minutes.

2070. Refer to Figure 4. At the airspeed represented by point a, in steady flight, the airplane will

1—be structurally damaged by full deflection of the controls.
2—have its maximum lift/drag ratio.
3—have its minimum lift/drag ratio.
4—be developing its maximum coefficient of lift.

2071. Refer to Figure 4. At an airspeed represented by point b, in steady flight, the pilot can expect to obtain the airplane's

1—minimum glide range in still air.
2—maximum glide range in still air.
3—maximum coefficient of lift.
4—minimum coefficient of lift.

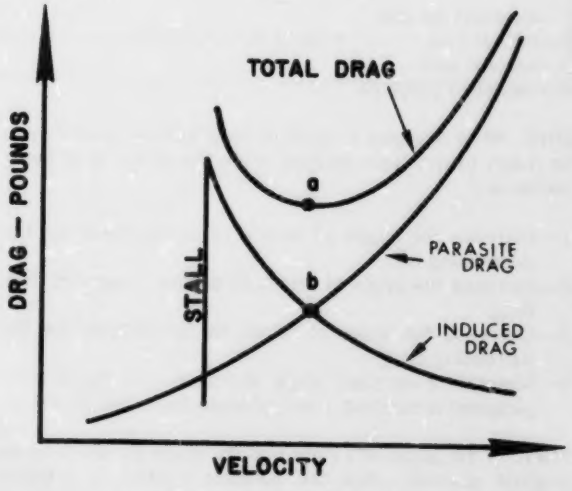


Figure 4

2072. What pilot technique is recommended for effective visual scanning in collision avoidance?

1—Scan with a series of short, regularly spaced eye movements that bring successive areas of the sky into the center of the visual field.
2—Scan by continually switching views between items in the cockpit and distance objects.
3—Move the eyes horizontally with each movement at least 30° and allow the focus to remain at each point approximately 1 second.
4—Maintain the focus straight ahead and allow peripheral vision to detect collision threats from the left and right.

2073. If the airplane's nose remains in the new position after the elevator control is pressed forward and released, the airplane displays

1—negative longitudinal static stability.
2—neutral longitudinal dynamic stability.
3—positive longitudinal static stability.
4—neutral longitudinal static stability.

2074. Longitudinal dynamic instability in an airplane can be identified by

1—the need to apply continuous forward pressure on the elevators.
2—the need to apply continuous back pressure on the elevators.
3—pitch oscillations becoming progressively steeper.
4—bank oscillations becoming progressively steeper.

2075. Longitudinal stability involves the motion of the airplane about its

1—longitudinal axis.
2—lateral axis.
3—vertical axis.
4—center of pressure.

2076. What changes in airplane longitudinal control must be made to maintain altitude while the airspeed is being decreased?

1—Increase the angle of attack to compensate for the decreasing lift.
2—Increase the angle of attack to produce more lift than drag.
3—Decrease the angle of attack to compensate for the increasing drag.
4—Maintain a constant angle of attack until the desired airspeed is reached, then increase the angle of attack.

2077. If the airplane's nose initially tends to return to its original position after the elevator control is pressed forward and released, the airplane displays

1—positive dynamic stability.
2—positive static stability.
3—negative dynamic stability.
4—neutral dynamic stability.

2078. If the airplane's nose initially tends to move farther from its original position after the elevator control is pressed forward and released, the airplane displays

1—negative static stability.
2—positive static stability.
3—negative dynamic stability.
4—neutral dynamic stability.

2079. Refer to Figure 5. While rolling into a right turn, if the inclinometer appears as illustrated in A, the HCL and CF vectors would be acting on the airplane as illustrated in

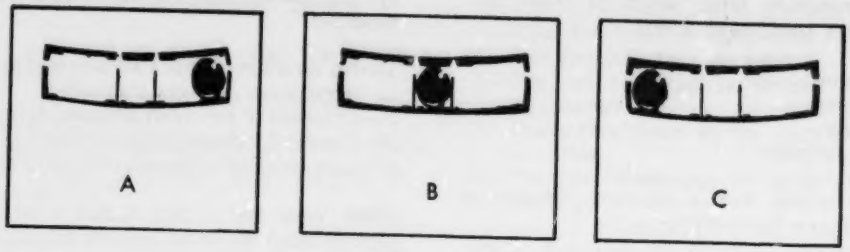
1—5, and more right rudder pressure is needed to center the ball.
2—2, and more right rudder pressure is needed to center the ball.
3—4, and more left rudder pressure is needed to center the ball.
4—2, and more left rudder pressure is needed to center the ball.

2080. Refer to Figure 5. While rolling into a right turn, if the inclinometer appears as illustrated in C, the HCL and CF vectors would be acting on the airplane as illustrated in

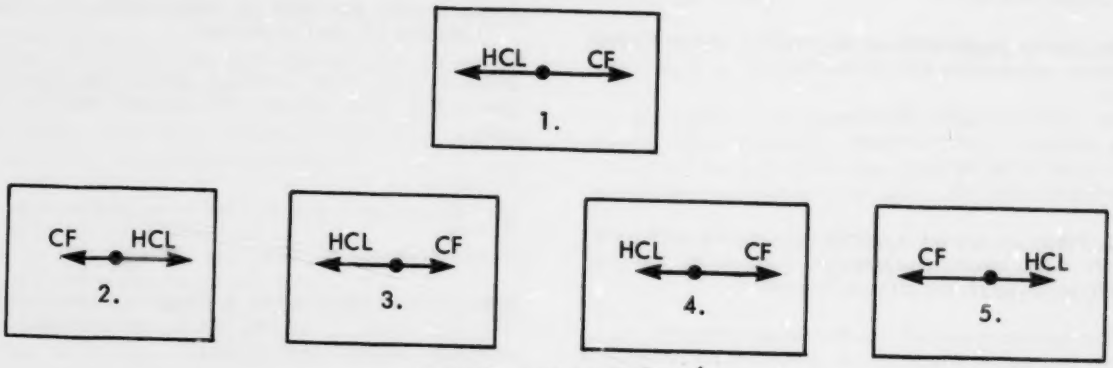
1—2, and less right rudder pressure is needed to center the ball.
2—5, and more right rudder pressure is needed to center the ball.
3—5, and less right rudder pressure is needed to center the ball.
4—3, and more right rudder pressure is needed to center the ball.

2081. Refer to Figure 5. While rolling out of a left turn, if the inclinometer appears as illustrated in A, the HCL and CF vectors would be acting on the airplane as illustrated in

1—3, and more right rudder pressure is needed to center the ball.
2—2, and more left rudder pressure is needed to center the ball.
3—1, and more left rudder pressure is needed to center the ball.
4—4, and more right rudder pressure is needed to center the ball.



INCLINOMETER



FORCE VECTORS

NOTE: HCL DENOTES HORIZONTAL COMPONENT OF LIFT.
CF DENOTES CENTRIFUGAL FORCE.
LENGTH OF ARROWS DENOTES MAGNITUDE OF FORCE.

Figure 5

2082. If a suction gauge indicates the pressure to be lower than the minimum limit, which of these air–operated instruments would be affected?

1—Airspeed indicator.
2—Pressure altimeter.
3—Heading indicator.
4—Vertical–speed indicator.

2083. One characteristic that a properly functioning gyroscope depends upon for operation is the

1—resistance to deflection of the spinning wheel or disc.
2—ability to resist precession 90° to any applied force.
3—position of the gyro base relative to the axis of the Earth.
4—deflection force developed from the angular velocity of the spinning wheel.

2084. During deceleration of an airplane, some attitude indicators will precess and falsely indicate

1—an increase in pitch attitude.
2—a decrease in pitch attitude.
3—a bank to the right.
4—a bank to the left.

2085. When an aircraft is rapidly accelerated, such as on takeoff, what inherent precession characteristic, if any, will be displayed on the attitude indicator?

1—The miniature aircraft would indicate a descent.
2—No precession characteristic is evident unless a force perpendicular to the longitudinal axis is involved.
3—The miniature aircraft would indicate a climb.
4—It depends on whether the attitude indicator is an electric or vacuum type.

2086. If the pitot cover is not removed on an aircraft with the static source on the side of the fuselage, which instrument(s) would be affected?

1—Airspeed only.
2—Vertical speed and airspeed only.
3—Altimeter and airspeed only.
4—Airspeed, altimeter, and vertical speed.

2087. If the pitot tube and outside static vents or ports were clogged, which instrument or instruments would be affected?

1—The airspeed indicator, altimeter, and turn–and–slip indicator.
2—The altimeter, vertical–speed indicator, and airspeed indicator would provide inaccurate instrument readings.
3—The only instruments that would provide erroneous indications would be the airspeed indicator and altimeter.
4—The airspeed indicator would indicate excessively high airspeeds.

2088. If both the ram air input and drain hole of the pitot system are blocked, what airspeed indication can be expected?

1—No variation of indicated airspeed in level flight even if large power changes are made.
2—Decrease of indicated airspeed during a climb.
3—Constant indicated airspeed during a descent.
4—Zero indicated airspeed until blockage is removed.

2089. What can a pilot expect if an airspeed indicator ram air input and drain hole are blocked?

1—The airspeed indicator may react as an altimeter.
2—The airspeed indicator will show a decrease with an increase in altitude.
3—No airspeed indicator change will occur during climbs or descents.
4—As speed increases in level flight, the airspeed indicator will show a decrease.

2090. If the static pressure ports iced over while descending from altitude, the airspeed indicator would read

1—zero.
2—high.
3—low.
4—correctly.

2091. If the pitot opening is clogged by ice or dirt or if the pitot cover is left on, which instrument(s) will be affected? (Separate static source.)

1—Airspeed indicator, altimeter, and vertical–speed indicator.
2—Airspeed indicator and altimeter only.
3—Airspeed indicator and vertical–speed indicator only.
4—Airspeed indicator only.

2092. If the ram air input to the pitot head of the pitot system becomes blocked (drain hole open), the indicated airspeed will generally

1—decrease as altitude is increased.
2—remain unchanged.
3—increase as altitude is increased.
4—drop to zero.

2093. If the static pressure tubes are broken inside a pressurized cabin during a high–altitude flight, the altimeter would probably indicate

1—higher than actual flight altitude.
2—sea level.
3—a fluctuating altitude.
4—lower than actual flight altitude.

2094. What effect would using the alternate source of static pressure (which is vented inside an unpressurized airplane) have on the airplane instrument indications?

1—The altimeter may indicate higher than the actual altitude being flown.
2—The airspeed indicator may indicate slower than the actual airspeed being flown.
3—The turn needle may become inoperative.
4—The vertical velocity indicator may indicate a continuous descent.

2095. Which statement is true regarding vertical–speed indicators?

1—A 9– to 12–second lag is required to stabilize the pressure within the instrument.
2—Level–flight attitude is attained when the instrument indicates zero.
3—Rough control techniques may result in unreliable needle indications.
4—This instrument does not automatically compensate for temperature changes.

2096. Select the true statement pertaining to the operations of a vertical–speed indicator.

1—A zero indication on the instrument indicates a level–flight attitude.
2—A 9– to 12–second lag occurs before the pressure within the instrument is stabilized.
3—Turbulent air dampens the needle fluctuations, resulting in reliable indications.
4—The instrument automatically compensates for temperature changes.

2097. Which statement is true regarding variometers?

1—A common problem in pellet variometers is stickiness of the piston because of dirt, moisture, or static electricity in the tapered tubes.
2—A variometer is generally considered to be less sensitive and has a slower response time than a vertical–speed indicator.
3—Variometers do not utilize outside air static pressure lines.
4—The total energy variometer, when properly installed, is responsive only to a change in a portion of the total energy of the glider.

2098. What is an operational difference between the turn coordinator and the turn–and–slip indicator?

1—The turn coordinator is always electric; the turn–and–slip indicator is always vacuum–driven.
2—The turn coordinator indicates bank angle only; the turn–and–slip indicator indicates rate of turn and coordination.
3—The turn coordinator indicates roll rate, rate of turn, and coordination; the turn–and–slip indicator indicates rate of turn and coordination.
4—The turn coordinator indicates angle of bank; the turn–and–slip indicator indicates turn rate in coordinated flight.

2099. Which feature of the turn coordinator differs from the turn–and–slip indicator?

1—After the bank is established, the airplane symbol indicates only the rate of roll.
2—The roll rate can be sensed before the turn is established.
3—The inclinometer in the turn coordinator is more sensitive.
4—The turn coordinator will show both bank and pitch information.

2100. What rate of turn, if any, is indicated by illustration G? (See Figure 6.)

1—1–1/2° per second.
2—None, the right wing is low.
3—3° per second.
4—10° per second.

2101. According to Illustration H, Figure 6, the airplane would be in a

1—20° bank to the right.
2—30° bank to the left.
3—3° per second turn to the right.
4—3° per second turn to the left.

2102. Which illustration indicates that the aircraft is making a standard rate turn but is skidding? (See Figure 6.)

1—E.
2—F.
3—G.
4—H.

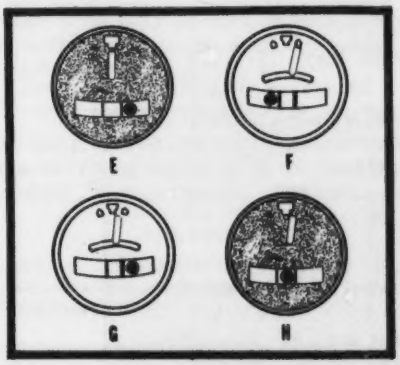


Figure 6

2103. Which condition during taxi is an indication that an attitude indicator is unreliable?

1—The horizon bar tilts more than 5° while making taxi turns.
2—The horizon bar vibrates during warmup.
3—The horizon bar does not align itself with the miniature airplane after warmup.
4—The miniature airplane does not tilt sufficiently to indicate a turn while taxiing.

2104. During a stabilized descending turn at constant rate, which of these instruments provides the most pertinent information with respect to pitch control?

1—Altimeter.
2—Airspeed indicator.
3—Vertical speed indicator.
4—Attitude indicator.

2105. During level flight, which instrument provides the most pertinent information with respect to pitch control?

1—Altimeter.
2—Airspeed indicator.
3—Attitude indicator.
4—Vertical-speed indicator.

2106. Which instrument provides the most pertinent information (primary) for bank control in straight-and-level flight?

1—Turn-and-slip indicator.
2—Attitude indicator.
3—Heading indicator.
4—Magnetic compass.

2107. If your airplane is in an unusual flight attitude and the attitude indicator has exceeded its limits, which instruments should you first rely on to determine pitch attitude before starting recovery?

1—Turn indicator and vertical speed indicator.
2—Airspeed and altimeter.
3—Vertical speed indicator and airspeed to detect approaching V_{S1} or V_{MO}.
4—Turn indicator and rate of climb.

2108. Which instruments should be used to make a pitch correction when you have deviated from your assigned altitude?

1—Altimeter and vertical speed indicator.
2—Manifold pressure gauge and vertical speed indicator.
3—Manifold pressure gauge and airspeed indicator.
4—Attitude indicator, altimeter, and vertical speed indicator.

2109. Which instruments, in addition to the attitude indicator, are pitch instruments?

1—Altimeter and turn coordinator.
2—Altimeter and airspeed only.
3—Altimeter and vertical-speed indicator only.
4—Altimeter, airspeed indicator, and vertical-speed indicator.

2110. Which instruments are grouped as pitch instruments?

1—Altimeter, airspeed, and manifold pressure or RPM.
2—Attitude indicator, airspeed indicator, and manifold pressure or RPM.
3—Attitude indicator, altimeter, and manifold pressure gauge.
4—Attitude indicator, altimeter, airspeed indicator, and vertical-speed indicator.

2111. Which is true regarding variometers?

1—A variometer is generally considered to be less sensitive and has a slower response time than a vertical-speed indicator.
2—A total energy variometer indicates actual thermal existence or nonexistence rather than indications of climb or descent due to stick thermals.
3—One of the advantages of the pellet variometer over the vane variometer, is that dirt, moisture, or static electricity will not affect its operation.
4—An electric variometer does not utilize outside air static pressure lines.

2112. Which is true concerning total energy compensators?

1—The instrument will register climbs that result from stick thermals.
2—The instrument responds to up and down air currents only.
3—The instrument reacts to climbs and descents like a conventional rate-of-climb indicator.
4—The instrument indicates the average rate of climb in a thermal.

2113. The advantage of total energy compensators is that this system

1—adds the effect of stick thermals to the total energy produced by thermals.
2—compensates for air pressure changes while climbing or descending.
3—reduces climb and dive errors on variometer indications caused by airspeed changes.
4—includes a speed ring around the rim of the variometer.

2114. What is an advantage of an electric turn coordinator if the airplane has a vacuum system for other gyroscopic instruments?

1—It is more accurate than vacuum-driven turn indicators.
2—It will not tumble as will vacuum-driven turn indicators.
3—It is a backup in case of vacuum system failure.
4—It is more reliable than the vacuum-driven indicators.

2115. During level flight, which instrument provides the most pertinent performance information with respect to power?

1—Manifold pressure gauge.
2—Vertical speed indicator.
3—Altimeter.
4—Airspeed indicator.

2116. During a stabilized climbing turn at constant rate, the instruments which indicate the correct pitch and bank are the

1—airspeed indicator and directional gyro.
2—vertical speed indicator and turn-and-slip indicator.
3—altimeter and turn-and-slip indicator.
4—flight indicator and turn-and-slip indicator.

2117. In a coordinated turn the displacement of the turn needle

1—indicates the angle of bank.
2—increases as the angle of bank increases and the airspeed decreases.
3—increases as the angle of bank decreases and the airspeed increases.
4—remains constant for a 30° bank regardless of the airspeed.

2118. What indications should you get from the turn-and-slip indicator during taxi?

1—The needle and ball should move freely in the direction of the turn.
2—The ball moves freely opposite the turn, and the needle deflects in the direction of the turn.
3—The needle deflects in the direction of the turn, but the ball remains centered.
4—The ball deflects opposite the turn, but the needle remains centered.

2119. What does the lower limit of the white arc on an airspeed indicator represent?

1—Power-off stall speed; gear and flaps extended.
2—Power-off stall speed; gear and flaps retracted.
3—Minimum controllable airspeed with flaps extended.
4—Minimum controllable speed during a power approach in landing configuration.

2120. The upper airspeed limit of the green arc on the airspeed indicator represents the maximum

1—structural cruising speed (V_{NO}).
2—landing gear lowering speed (V_{LE}).
3—design maneuvering speed (V_A).
4—allowable speed for smooth-air operations (V_{NE}).

2121. Refer to Figure 7. The vertical line from point E to point F is represented on the airspeed indicator by the

1—yellow arc.
2—red line.
3—green arc.
4—white arc.

2122. Refer to Figure 7. The horizontal dashed line from point C to point E represents the

1—maximum structural cruise airspeed range.
2—positive limit load factor.
3—airspeed range for normal operations.
4—ultimate load factor.

2123. Refer to Figure 7. The vertical line from point D to point G is represented on the airspeed indicator by the

1—maximum speed limit of the green arc.
2—maximum speed limit of the yellow arc.
3—maximum speed limit of the white arc.
4—minimum speed limit of the green arc.

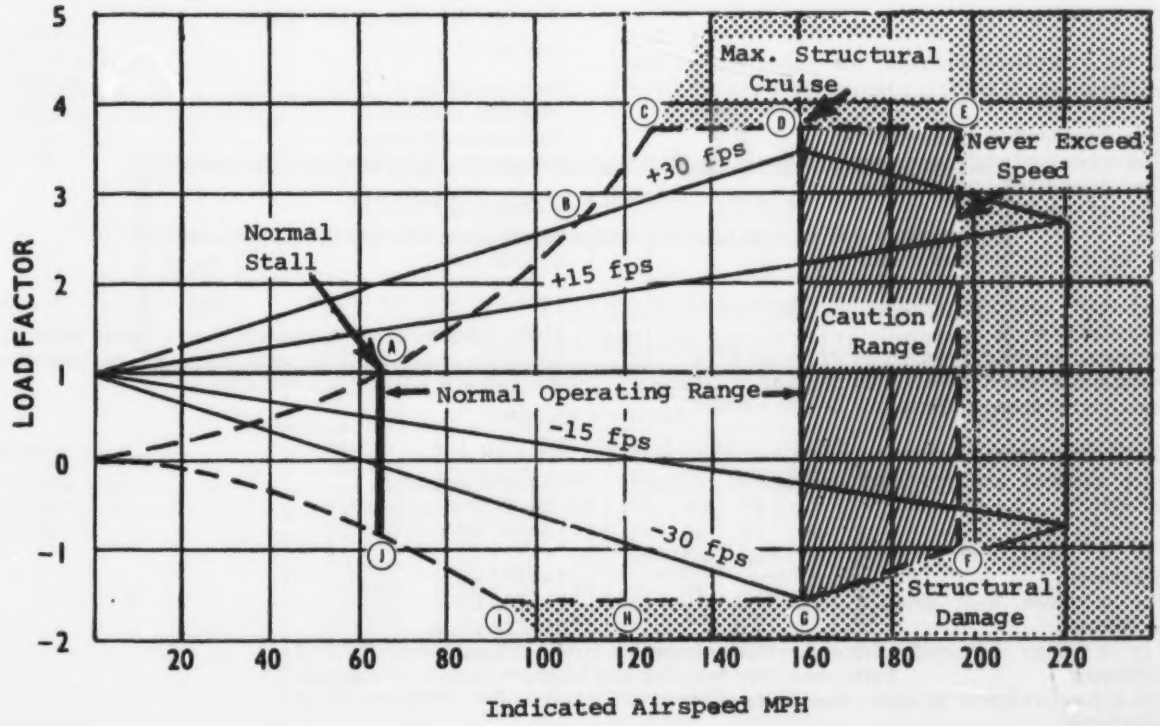


Figure 7

2124. What is an important airspeed limitation that is not color coded on airspeed indicators?

1—Never-exceed speed.
2—Maximum structural cruising speed.
3—Maneuvering speed.
4—Maximum flaps-extended speed.

2125. Which airspeed would a pilot be unable to identify by the color coding of an airspeed indicator?

1—The maximum landing gear extended speed.
2—The maximum flap operating speed.
3—The never-exceed speed.
4—The maximum structural cruising speed.

2126. Which of the following airspeeds is identified by color coding on an airspeed indicator?

1—The maximum gear operating or extended speed.
2—The maximum structural cruising speed.
3—The design maneuvering speed.
4—The stalling speed for all altitudes and configurations.

2127. What speed is indicated by the lowest airspeed limit of the white arc on the airspeed indicator?

1—The power-off stalling speed with gear and flaps in the landing position.
2—The power-on stalling speed with flaps and landing gear retracted.
3—The maximum speed at which to lower full flaps.
4—The maximum speed for flying in turbulent air or for abrupt maneuvers.

2128. What airspeed indicator marking identifies the maximum structural cruising speed of the airplane?

1—The upper limit of the white arc.
2—The upper limit of the green arc.
3—The upper limit of the yellow arc.
4—The red radial line.

2129. What is calibrated airspeed?

1—Indicated airspeed corrected for instrument and installation error.
2—Indicated airspeed corrected for air temperature.
3—Indicated airspeed corrected for pressure altitude.
4—Indicated airspeed corrected for density altitude.

2130. Which statement is true regarding the relationship of true airspeed and indicated airspeed as altitude increases?

1—For a given true airspeed, indicated airspeed decreases.
2—For a given true airspeed, indicated airspeed increases.
3—For a given indicated airspeed, true airspeed increases.
4—For a given indicated airspeed, true airspeed remains unaffected.

2131. How is true airspeed determined?

1—Correcting EAS for density altitude error.
2—Correcting CAS for instrument and position error.
3—Correcting IAS for compressibility.
4—Correcting IAS for density altitude error.

2132. The highest indicated airspeed will be obtained during level flight at a constant power setting when the outside air is

1—cold and dry.
2—warm and moist.
3—warm and dry.
4—cold and moist.

2133. Determine the corrected true airspeed from the conditions given. Use the charts in Figure 8, as necessary, to obtain the most correct response.

GIVEN:

Pressure altitude.....20,000 ft.
Indicated airspeed.....225 kts.
Indicated temperature.....–10° C.
True air temperature.....–20° C.

1—304 kts.
2—310 kts.
3—314 kts.
4—320 kts.

2134. Determine the corrected true airspeed from the conditions given. Use the charts in Figure 8, as necessary, to obtain the most correct response.

GIVEN:

Pressure altitude.....15,000 ft.
Indicated airspeed.....250 kts.
Indicated temperature.....–25° C.
True air temperature.....–35° C.

1—290 kts.
2—295 kts.
3—300 kts.
4—305 kts.

2135. Determine the corrected true airspeed from the conditions given. Use the charts in Figure 8, as necessary, to obtain the most correct response.

GIVEN:

Pressure altitude.....10,000 ft.
Indicated airspeed.....250 kts.
Indicated temperature.....–20° C.
True air temperature.....–28° C.

1—287 kts.
2—280 kts.
3—274 kts.
4—270 kts.

2136. If the outside air temperature increases during a flight at constant power and at a constant indicated altitude, the true airspeed will

1—increase and true altititude will decrease.
2—increase and true altitude will increase.
3—decrease and true altitude will decrease.
4—decrease and true altitude will increase.

2137. Determine the corrected true airspeed from the conditions given. Use the charts in Figure 8, as necessary, to obtain the most correct response.

GIVEN:

Pressure altitude.....15,000 ft.
Indicated airspeed.....230 kts.
Indicated temperature.....–15° C.
True air temperature.....–24° C.

1—270 kts.
2—276 kts.
3—280 kts.
4—287 kts.

2138. Determine the corrected true airspeed from the conditions given. Use the charts in Figure 8, as necessary, to obtain the most correct response.

GIVEN:

Pressure altitude.....25,000 ft.
Indicated airspeed.....220 kts.
Indicated temperature.....–35° C.
True air temperature.....–46° C.

1—326 kts.
2—318 kts.
3—312 kts.
4—306 kts.

2139. An airplane is flying at a constant power setting and constant indicated altitude. As a result of a decrease in the outside air temperature, the true airspeed will

1—decrease; the true altitude will increase.
2—decrease; the true altitude will decrease.
3—increase; the true altitude will increase.
4—increase; the true altitude will decrease.

2140. Determine the corrected true airspeed from the conditions given. Use the charts in Figure 8, as necessary, to obtain the most correct response.

GIVEN:

Pressure altitude.....20,000 ft.
Indicated airspeed.....200 kts.
Indicated temperature.....–15° C.
True air temperature.....–23° C.

1—266 kts.
2—270 kts.
3—274 kts.
4—277 kts.

2141. Determine the corrected true airspeed from the conditions given. Use the charts in Figure 8, as necessary, to obtain the most correct response.

GIVEN:

Pressure altitude.....25,000 ft.
Indicated airspeed.....242 kts.
Indicated temperature.....–30° C.
True air temperature.....–44° C.

1—370 kts.
2—363 kts.
3—351 kts.
4—342 kts.

AIRSPEED CORRECTION TABLE

FLAPS 0°												
KIAS	200	210	220	230	240	250	260	270	280	290	300	310
KCAS	199	209	219	229	238	248	258	267	277	287	297	307

Correction Factor "F" (Heat of Compression)
For True Air Speed

PRESS. ALT.	CALIBRATED AIR SPEED - KNOTS							
	200	250	300	350	400	450	500	550
10,000	1.0	1.0	.99	.99	.98	.98	.97	.97
20,000	.99	.98	.97	.97	.96	.95	.94	.93
30,000	.97	.96	.95	.94	.92	.91	.90	.89
40,000	.96	.94	.92	.90	.88	.87	.87	.86
50,000	.93	.90	.87	.86	.84	.84	.84	.84

DIRECTIONS: Use Calibrated Air Speed and Pressure Alt. to obtain "F" Factor. Multiply TAS obtained from computer by "F" to obtain TAS corrected for compressibility.

Figure 8

2142. If 80 MPH indicated airspeed has been used on final approach at an airport at sea level, the indicated airspeed on final approach to an airport where the field elevation is 4,800 feet MSL should be

1—lower because the true airspeed is higher.
2—higher because the stalling speed is higher.
3—lower because the air density is lower.
4—the same as sea level airports.

2143. If a pilot plans to land at an airport where the elevation is 7,500 feet, the indicated approach airspeed should be

1—higher than that used for a sea level airport, and some power should be used until touchdown.
2—the same as that used at a sea level airport.
3—lower than that used at a sea level airport.
4—higher than that used at a sea level airport.

2144. What indicated airspeed should be used for takeoff from high elevation airports as compared with indicated airspeed for takeoff from lower elevation airports?

1—Use the same indicated airspeed at all airport elevations.
2—Use a lower indicated airspeed at elevations above 5,000 feet.
3—Use a higher indicated airspeed at elevations above 5,000 feet.
4—The airspeed used at high elevation airports should be 1.3 times greater than the speed recommended for sea level takeoff.

2145. The landing speed, in terms of true airspeed, for a particular weight and configuration of the aircraft will

1—increase as relative humidity is decreased.
2—increase as altitude is increased.
3—remain constant regardless of altitude.
4—decrease as atmospheric pressure is decreased.

2146. Airspeed which has been corrected for installation and instrument error, is called

1—calibrated airspeed.
2—true airspeed.
3—equivalent airspeed.
4—indicated airspeed.

2147. For each 1,000-foot increase in altitude, true airspeed will increase approximately

1—2 percent of the indicated airspeed.
2—3.5 percent of the indicated airspeed.
3—5 percent of the indicated airspeed.
4—10 percent of the indicated airspeed.

2148. Refer to Figure 9. Which airspeed represents V_{SI}?

1—67 MPH.
2—75 MPH.
3—125 MPH.
4—140 MPH.

2149. Refer to Figure 9. Which airspeed represents V_{FE}?

1—67 MPH.
2—75 MPH.
3—125 MPH.
4—180 MPH.

2150. Refer to Figure 9. Which airspeed represents V_{NE}?

1—125 MPH.
2—180 MPH.
3—185 MPH.
4—227 MPH.

2151. Refer to Figure 9. What is the maximum structural cruising speed?

1—180 MPH.
2—185 MPH.
3—225 MPH.
4—227 MPH.

2152. Refer to Figure 9. Which airspeed represents V_{SO}?

1—40 MPH.
2—67 MPH.
3—75 MPH.
4—125 MPH.

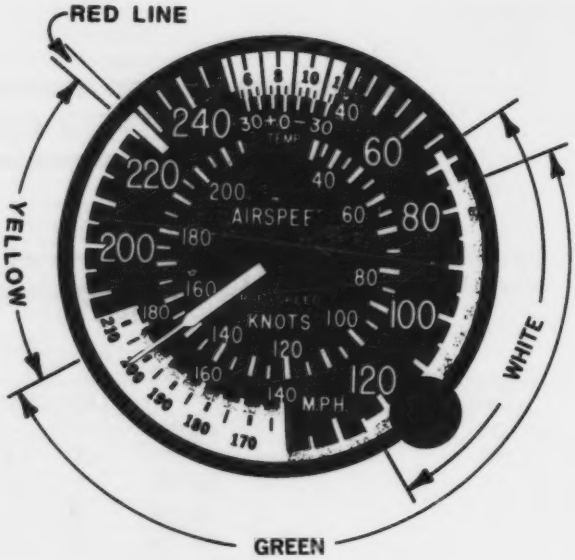


Figure 9

2153. What is the cause of northerly turning error in a conventional magnetic compass?

1—The vertical component of the Earth's magnetic field.
2—The balancing weights on one end of the steel magnetic needles.
3—Centrifugal force that is created during a turn.
4—Centripetal force that is created during a turn.

2154. If a standard rate turn is maintained, how much time would be required to turn clockwise from a heading of 090° to a heading of 180°?

1—30 seconds.
2—1 minute.
3—1 minute 30 seconds.
4—2 minutes.

2155. Which statement is true about magnetic deviation of a compass?

1—Deviation is different in a given aircraft in different localities.
2—Deviation is the same for all aircraft on different headings.
3—Deviation varies for different headings of the same aircraft.
4—Deviation is the same for all aircraft in the same locality.

2156. What causes magnetic compass deviation?

1—Northerly turning error.
2—Magnetic attractions in the aircraft.
3—Acceleration and deceleration of the aircraft.
4—Vertical component of the Earth's magnetic field.

2157. The deviation error of a magnetic compass varies according to the

1—airplane electrical systems in use.
2—headings being flown, and is the same for all airplanes.
3—geographic location of the airplane.
4—airspeed changes as the airplane accelerates.

2158. Deviation in a magnetic compass is caused by

1—presence of flaws in the permanent magnets of the compass.
2—the difference in the location between true north and magnetic north.
3—magnetic ore deposits in the Earth distorting the lines of magnetic force.
4—magnetic fields within the airplane distorting the lines of magnetic force.

2159. The compensating magnets of a magnetic compass should be adjusted

1—on not less than 90° increments.
2—with the radio equipment off.
3—with the engine shut down.
4—with the engine running.

2160. On the taxi check, the magnetic compass should

1—be checked for proper deviation and fluid level.
2—swing opposite to the direction of turn when turning from north.
3—exhibit the same number of degrees of dip as the latitude.
4—swing freely and indicate known headings.

2161. What is deviation?

1—The angular difference between true north and magnetic north.
2—Erroneous magnetic compass indications due to acceleration/deceleration forces.
3—Magnetic compass errors due to the compass tending to point toward the Earth's surface as well as to magnetic north.
4—Magnetic disturbances within an aircraft that deflect the magnetic compass.

2162. Which is true regarding a magnetic compass?

1—Compass deviation is the angular difference between true north and magnetic north.
2—Magnetic variation is the deflection of the compass needles which is caused by magnetic attractions in the airplane.
3—Magnetic dip increases with an increase in latitude.
4—The direction of turn error is the same anywhere in the world.

2163. While in a shallow turn, the magnetic compass card

1—continues to rotate in a direction opposite to that of the turn.
2—continues to rotate in the same direction as the turn.
3—remains stationary in relation to the airplane throughout the turn.
4—remains stationary and the airplane rotates around the compass card.

2164. The error which causes the magnetic compass to indicate a turn to the north when on a heading of east is known as

1—dip error.
2—deceleration error.
3—northerly turning error.
4—acceleration error.

2165. In the Northern Hemisphere, which would be correct about starting the rollout from a turn using a magnetic compass?

1—Start the rollout before the compass indication reaches south by approximately 30° plus the pilot's normal lead.
2—Start the rollout before the compass indication reaches south by a number of degrees approximately equal to the latitude over which the turn is made plus the pilot's normal lead.
3—Start the rollout before the compass indication reaches south by a number of degrees approximately equal to the magnetic variation of the area over which the turn is made plus the pilot's normal lead.
4—Start the rollout after the compass indication passes south by a number of degrees approximately equal to the latitude minus the normal rollout lead.

2166. Select the true statement regarding the magnetic compass.

1—If on a northerly heading and a turn is made toward the east, the compass will show a greater amount of turn than is actually made.
2—If on a westerly heading the aircraft's speed is decreased, the compass will indicate a turn to the north.
3—If on a southerly heading a turn is made toward the west, the compass will indicate a turn in the opposite direction.
4—If on an easterly heading the aircraft is accelerated, the compass will indicate a turn toward the north.

2167. In the Northern Hemisphere, a magnetic compass will normally indicate a turn toward the north if

1—a right turn is entered from an east heading.
2—a left turn is entered from a west heading.
3—an aircraft is decelerated while on an east or west heading.
4—an aircraft is accelerated while on an east or west heading.

2168. What should be the indication on the magnetic compass when rolling into a standard rate turn to the right from a south heading in the Northern Hemisphere?

1—The compass will indicate a turn to the right, but at a faster rate than is actually occurring.
2—The compass will initially indicate a turn to the left.
3—The compass will remain on south for a short time, then gradually catch up to the magnetic heading of the airplane.
4—The compass will indicate the approximate correct magnetic heading if the roll into the turn is smooth.

2169. In the Northern Hemisphere, which is a characteristic of the magnetic compass?

1—If the aircraft is decelerated while on an east or west heading, the compass will initially indicate a turn to the south.
2—If the aircraft is accelerated while on an east or west heading, the compass will initially indicate a turn to the south.
3—If a right turn is entered from a north heading, the compass will initially indicate a turn to the east.
4—If a left turn is entered from a south heading, the compass will initially indicate a turn to the west.

2170. Which is true about the effect of temperature changes on the indications of a sensitive altimeter?

1—Colder–than–standard temperatures will place the aircraft lower than the altimeter indicates.
2—Warmer–than–standard temperatures will place the aircraft lower than the altimeter indicates.
3—Colder–than–standard temperatures will place the aircraft higher than the altimeter indicates.
4—Temperature changes have no effect on the altimeter indications.

2171. An altimeter is set to 29.84" Hg and the correct altimeter setting is 30.00" Hg. If under these conditions a landing is made at an airport where the field elevation is 772 feet, the altimeter would indicate approximately

1—932 feet.
2—160 feet.
3—612 feet.
4—772 feet.

2172. En route at FL270, the altimeter is set correctly. On descent, a pilot fails to reset it to a local altimeter setting of 30.32. If the field elevation is 1,300 feet and the altimeter is functioning properly, what will it indicate after landing?

1—1,700 feet.
2—900 feet.
3—400 feet.
4—Sea level.

2173. En route at FL250, the altimeter is set correctly. On descent, a pilot fails to reset it to a local altimeter setting of 30.57. If the field elevation is 650 feet, and the altimeter is functioning properly, what will it indicate after landing?

1—Sea level.
2—585 feet.
3—715 feet.
4—1,300 feet.

2174. Refer to Figure 10. Which of the compass indications shown would the pilots of airplanes 1 and 4, respectively, most likely observe as the airplane rolls into each of these turns?

1—A and D.
2—A and F.
3—C and D.
4—C and F.

2175. Refer to Figure 10. Which of the compass indications shown would the pilots of airplanes 2 and 3, respectively, most likely observe as the airplane rolls into each of these turns?

1—A and D.
2—A and F.
3—C and D.
4—C and F.

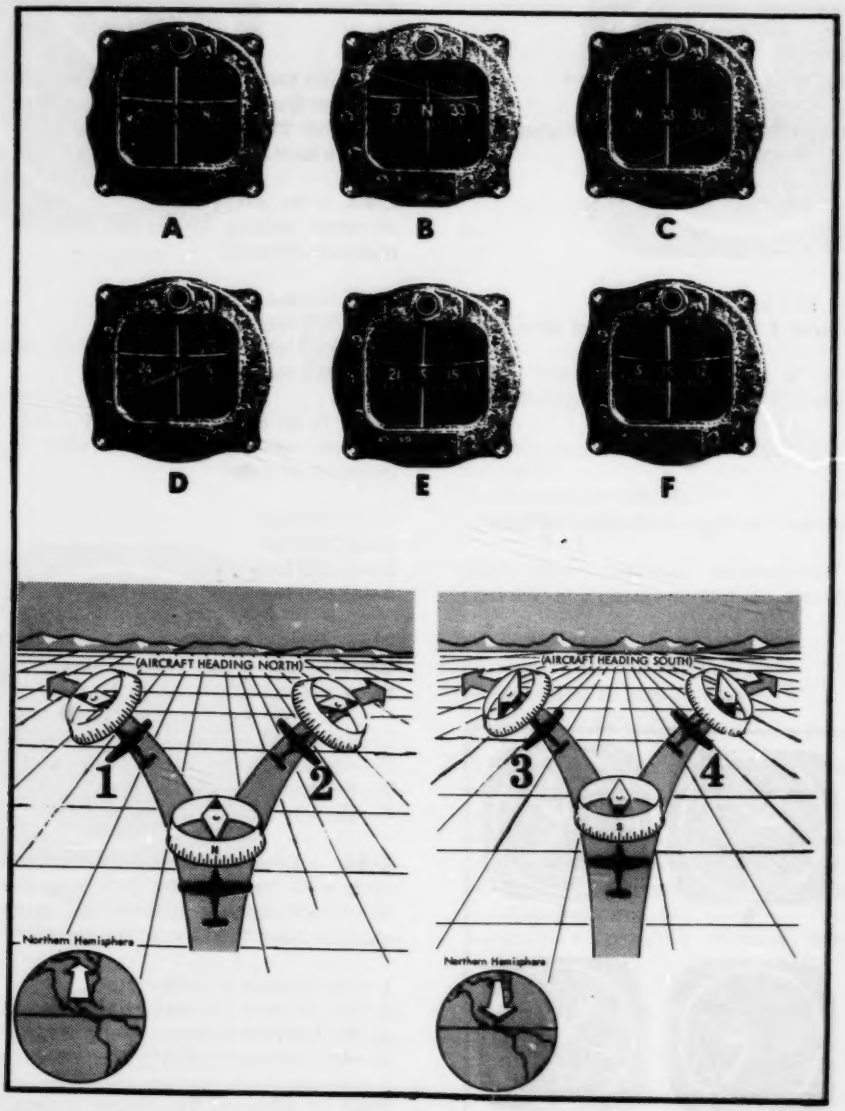


Figure 10

2176. For a given indicated airspeed, a high density altitude will always result in

1—an increase in equivalent airspeed.
2—an increase in true airspeed.
3—a decrease in true airspeed.
4—an increase in calibrated airspeed.

2177. What will increase with an increase in density altitude?

1—Indicated stall speed.
2—Glide ratio.
3—True airspeed.
4—Indicated never-exceed speed.

2178. Refer to altimeter B in Figure 11. What altitude is indicated?

1—1,880 feet.
2—880 feet.
3—7,880 feet.
4—8,880 feet.

2179. Refer to altimeter E in Figure 11. What altitude is indicated?

1—10,420 feet.
2—2,420 feet.
3—12,420 feet.
4—20,420 feet.

2180. Refer to altimeter F in Figure 11. What altitude is indicated?

1—880 feet.
2—9,880 feet.
3—10,880 feet.
4—1,880 feet.

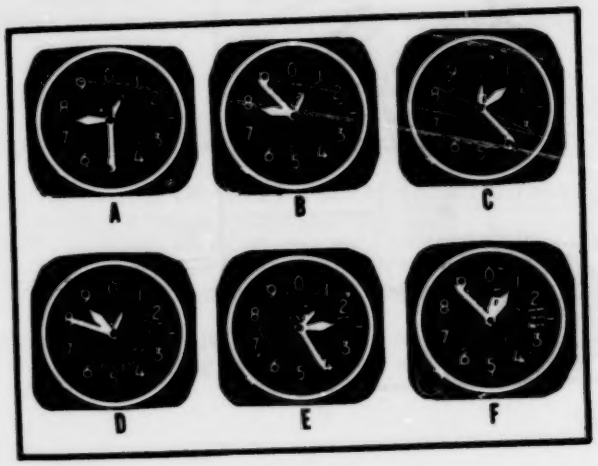


Figure 11

2181. What effect does flying into a colder air mass have on true airspeed and true altitude if the aircraft maintains a constant pressure altitude and CAS?

1—Lower TAS and a lower true altitude.
2—Higher TAS and a lower true altitude.
3—Higher TAS and a higher true altitude.
4—Lower TAS and a higher true altitude.

2182. If a flight is made from an area of high pressure into an area of low pressure without adjusting the altimeter setting, the actual altitude of the airplane would be

1—at the same level as the altimeter indicates.
2—lower than the altimeter indicates.
3—higher than the altimeter indicates.
4—at a level below the standard datum plane.

2183. If an altimeter indicates 3,500 feet MSL with an altimeter setting of 29.68, what is the approximate pressure altitude?

1—3,740 feet.
2—3,500 feet.
3—3,160 feet.
4—2,968 feet.

2184. If an altimeter indicates 2,500 feet MSL with an altimeter setting of 30.30, what is the approximate pressure altitude?

1—2,500 feet.
2—2,880 feet.
3—3,030 feet.
4—2,120 feet.

2185. Which change will cause the altimeter of an aircraft, parked on an airport ramp, to indicate lower than the actual elevation?

1—Temperature increase.
2—Atmospheric pressure increase.
3—Pressure altitude increase.
4—Density altitude increase.

2186. A pilot parks an airplane on the airport parking ramp with the altimeter indicating the correct elevation. Which atmospheric change will cause the altimeter to indicate lower than the actual elevation?

1—An increase in temperature.
2—An increase in pressure altitude.
3—An increase in atmospheric pressure.
4—An increase in density altitude.

2187. If, while on the ground, a sensitive altimeter is set to 29.92" Hg and the ambient pressure is 29.92" Hg, the altimeter will indicate

1—density altitude.
2—zero.
3—field elevation.
4—true altitude.

2188. What altitude does the altimeter in Figure 12 indicate?

1—10,880 feet.
2—9,880 feet.
3—1,880 feet.
4—880 feet.

Figure 12

2189. What altitude does the altimeter in Figure 13 indicate?

1—750 feet.
2—1,750 feet.
3—7,500 feet.
4—17,500 feet.

Figure 13

2190. What altitude does the altimeter in Figure 14 indicate?

1—50 feet.
2—150 feet.
3—1,500 feet.
4—10,500 feet.

Figure 14

2191. The pressure altitude at a given location is indicated by the altimeter after it is set to

1—the current altimeter setting.
2—29.92.
3—the density altitude.
4—the field elevation.

2192. When ambient temperature is warmer than standard at a particular altitude, the altimeter will indicate

1—higher than true altitude.
2—lower than true altitude.
3—the same as true altitude.
4—pressure altitude.

2193. The reported altimeter setting of a given station is the

1—actual barometric pressure measured at the station.
2—actual barometric pressure measured at sea level.
3—station's barometric pressure corrected to mean sea level pressure.
4—station's pressure altitude adjusted for existing temperature.

2194. GIVEN:

Pressure altitude.....4,000 ft.
True air temperature.....+20° C.

From the conditions given, the approximate density altitude is

1—3,500 ft.
2—4,300 ft.
3—5,300 ft.
4—7,500 ft.

2195. When the altimeter setting is 30.10 and the temperature is 100° F at an elevation of 2,595 feet, the density altitude is approximately (see Figure 15)

1—5,400 feet.
2—6,100 feet.
3—3,200 feet.
4—2,200 feet.

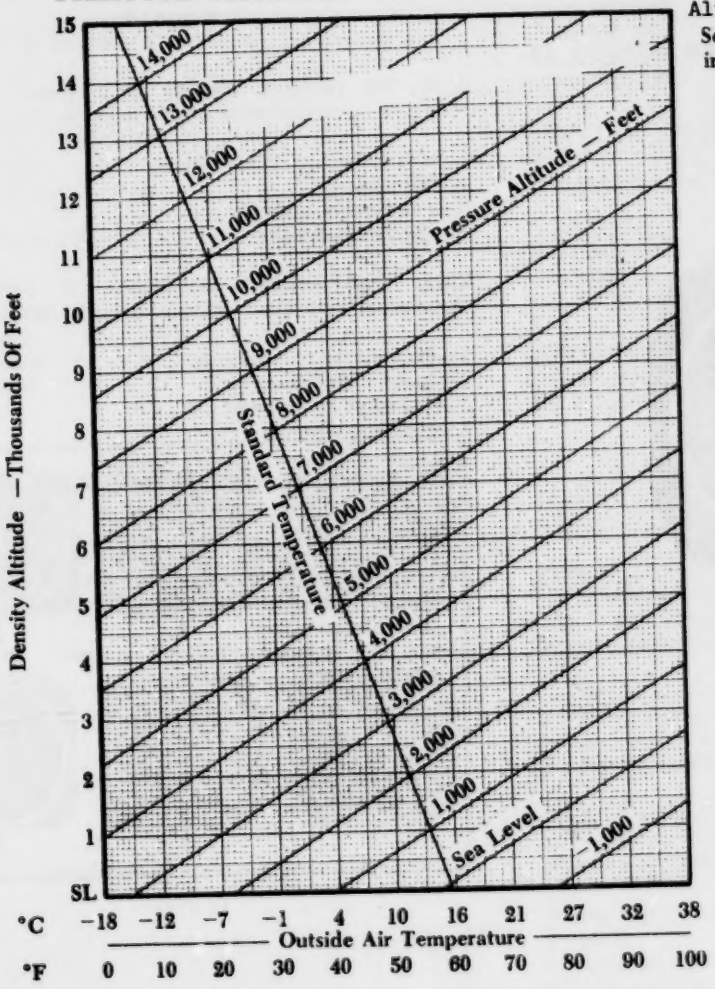
2196. The ambient temperature and altimeter setting are 95° F and 29.85, respectively, at an airport having an elevation of 4,695 feet. The density altitude at that airport would be approximately (see Figure 15)

1—4,695 feet.
2—6,250 feet.
3—4,760 feet.
4—8,200 feet.

2197. The ambient temperature and altimeter setting are 75° F and 29.85, respectively, at an airport having an elevation of 4,695 feet. The density altitude at that airport would be approximately (see Figure 15)

1—1,800 feet.
2—4,600 feet.
3—4,760 feet.
4—6,800 feet.

PRESSURE ALTITUDE AND DENSITY CHART



Altimeter Setting in Hg.	Altitude Addition For Obtaining Pressure Altitude
28.0	1,825
28.1	1,725
28.2	1,630
28.3	1,535
28.4	1,435
28.5	1,340
28.6	1,245
28.7	1,150
28.8	1,050
28.9	955
29.0	865
29.1	770
29.2	675
29.3	580
29.4	485
29.5	390
29.6	300
29.7	205
29.8	110
29.9	20
29.92	0
30.0	−75
30.1	−165
30.2	−257
30.3	−350
30.4	−440
30.5	−530
30.6	−620
30.7	−710
30.8	−805
30.9	−895
31.0	−965

Figure 15

2198. Refer to Figure 16.
GIVEN:

Airport pressure altitude.....500 ft.
Airport temperature.....6° C
Gross weight.....3,200 lb.
Headwind.....10 kts.
3 blade prop

What would be the takeoff ground roll under the given conditions?

1—1,100 ft.
2—1,270 ft.
3—975 ft.
4—920 ft.

2199. Refer to Figure 16.
GIVEN:

Airport pressure altitude.....2,800 ft.
Airport temperature.....0° C
Gross weight.....3,600 lb.
Headwind.....5 kts.
2 blade prop

What would be the takeoff ground roll under the given conditions?

1—1,545 ft.
2—1,600 ft.
3—1,700 ft.
4—1,800 ft.

2200. Refer to Figure 16.
GIVEN:

Airport pressure altitude.....4,000 ft.
Airport temperature.....20° C
Gross weight.....3,320 lb.
Headwind.....11 kts.
2 blade prop

What would be the takeoff ground roll under the given conditions?

1—1,700 ft.
2—1,620 ft.
3—1,900 ft.
4—2,000 ft.

2201. Refer to Figure 16.
GIVEN:

Airport pressure altitude.....2,000 ft.
Airport temperature.....–10° C
Gross weight.....3,280 lb.
Headwind.....14 kts.
3 blade prop

What would be the takeoff ground roll under the given conditions?

1—805 ft.
2—1,100 ft.
3—950 ft.
4—1,210 ft.

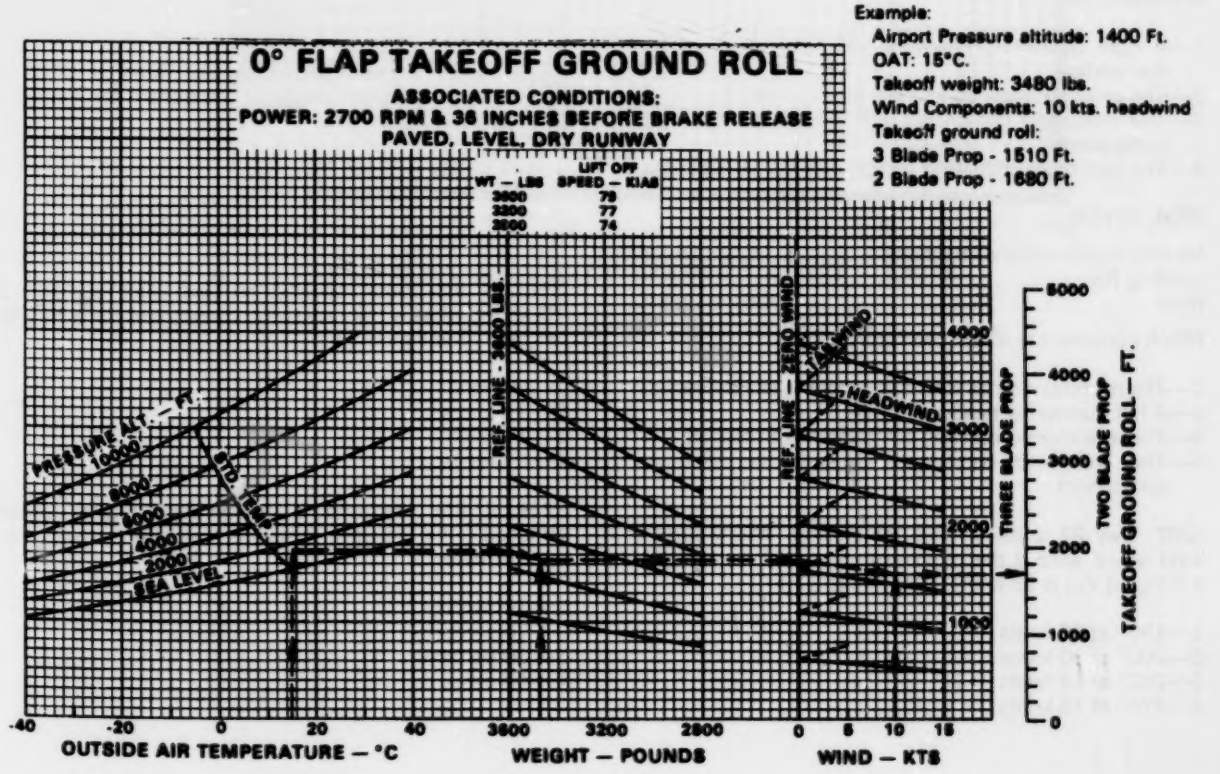


Figure 16

2202. The airplane being flown has a demonstrated crosswind capability of 12 knots. Which of these crosswind conditions would exceed the airplane's crosswind capability? (See Figure 17.)

1—A crosswind of 10 knots at a 90° angle.
2—A crosswind of 15 knots at a 30° angle.
3—A crosswind of 20 knots at a 40° angle.
4—A crosswind of 15 knots at a 45° angle.

2203. The airplane being flown has a demonstrated crosswind capability of 13 knots. Which of these crosswind conditions would exceed the airplane's crosswind capability? (See Figure 17.)

1—A crosswind of 30 knots at a 25° angle.
2—A crosswind of 20 knots at a 30° angle.
3—A crosswind of 50 knots at a 15° angle.
4—A crosswind of 25 knots at a 50° angle.

2204. Rwy 27 is being used for landing. Which surface wind would exceed the crosswind component of 0.2 V_{SO}, if V_{SO} of the airplane is 65 knots? (See Figure 17.)

1—350° at 10 knots.
2—320° at 15 knots.
3—220° at 20 knots.
4—240° at 25 knots.

2205. The maximum crosswind component of your airplane is 18 knots. The tower is reporting the surface wind from 310° at 35 knots and you plan to land on Rwy 35. Select the true statement. (See Figure 17.)

1—A right quartering headwind will be encountered on the landing.
2—The crosswind component will be 17 knots.
3—The crosswind component will exceed the headwind component.
4—The maximum crosswind component will be exceeded.

2206. GIVEN:

Maximum crosswind component.....15 kts.
Landing Rwy.....18
Wind.....225° at 20 kts.

Which statement is true? (See Figure 17.)

1—The maximum crosswind component is not exceeded.
2—A left quartering headwind exists.
3—The maximum crosswind component is exceeded.
4—The crosswind component exceeds the headwind component.

2207. Rwy 22 is being used for landing. Which surface wind would exceed the airplane's crosswind capability of 0.2 V_{SO}, if V_{SO} is 55 knots? (See Figure 17.)

1—190° at 20 knots.
2—200° at 30 knots.
3—260° at 15 knots.
4—270° at 15 knots.

2208. Rwy 30 is being used for landing. Which surface wind would exceed the airplane's crosswind capability of 0.2 V_{SO}, if V_{SO} is 60 knots? (See Figure 17.)

1—260° at 20 knots.
2—275° at 25 knots.
3—315° at 35 knots.
4—320° at 30 knots.

2209. The surface wind is 180° at 25 knots What is the crosswind component for a Rwy 13 landing? (See Figure 17.)

1—25 knots.
2—22 knots.
3—21 knots.
4—19 knots.

2210. Which wind would exceed a crosswind limitation of 25 knots for a Rwy 01 takeoff? (See Figure 17.)

1— 050° at 37 knots.
2— 080° at 26 knots.
3— 110° at 25 knots.
4— 070° at 30 knots.

2211. What is the headwind component for a Rwy 13 takeoff if the surface wind is 190° at 15 knots? (See Figure 17.)

1—20 knots.
2—15 knots.
3—13 knots.
4—7 knots.

2212. If the tower–reported surface wind is 020° at 18 knots, what is the crosswind component for a Rwy 13 landing? (See Figure 17.)

1—24 knots.
2—21 knots.
3—17 knots.
4—13 knots.

2213. If the tower–reported surface wind is 010° at 18 knots, what is the crosswind component for a Rwy 08 landing? (See Figure 17.)

1—7 knots.
2—15 knots.
3—17 knots.
4—21 knots.

2214. If the headwind is 10 percent of the takeoff airspeed, the takeoff distance will be reduced by approximately

1—10 percent.
2—20 percent.
3—30 percent.
4—40 percent.

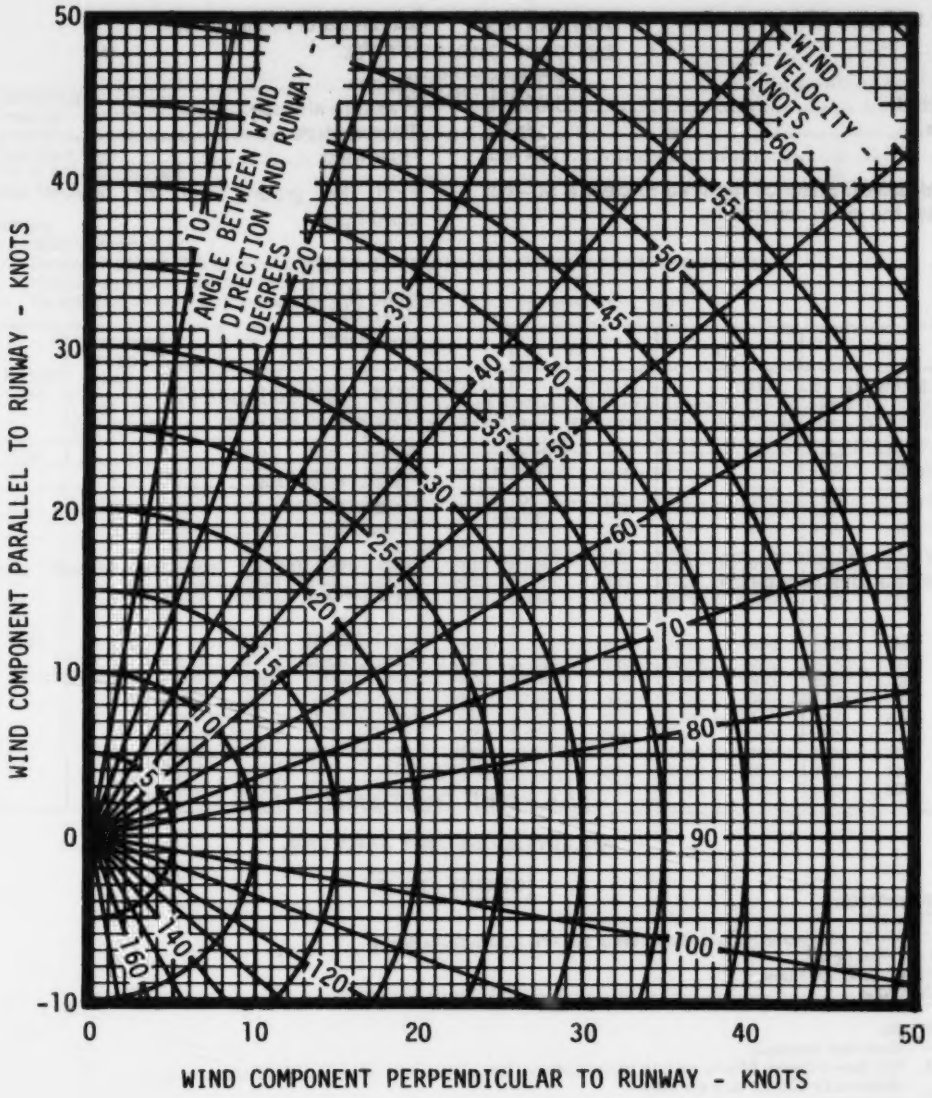

WIND COMPONENT PARALLEL TO RUNWAY - KNOTS
WIND COMPONENT PERPENDICULAR TO RUNWAY - KNOTS
ANGLE BETWEEN WIND DIRECTION AND RUNWAY - DEGREES
WIND VELOCITY - KNOTS
50
40
30
20
10
0
-10
0
10
20
30
40
50
10
20
30
40
45
50
55
60
35
40
50
60
70
80
90
100
25
20
15
10
5
140
160
120

Figure 17

2215. Refer to Figure 18.
GIVEN:

Weight.....4,000 lb.
Pressure altitude.....5,000 ft.
Temperature.....35° C
Headwind.....14 kts.

Find the total takeoff distance required to clear a 50–foot obstacle under the given conditions.

1—3,258 ft.
2—3,113 ft.
3—3,620 ft.
4—3,820 ft.

2216. Refer to Figure 19.
GIVEN:

Weight.....3,400 lb.
Pressure altitude.....6,500 ft.
Temperature.....38° C
Headwind.....6 kts.

Find the total takeoff distance required to clear a 50–foot obstacle under the given conditions.

1—2,286 ft.
2—2,514 ft.
3—2,538 ft.
4—2,555 ft.

2217. Refer to Figure 19.
GIVEN:

Weight.....3,400 lb.
Pressure altitude.....1,500 ft.
Temperature.....20° C
Headwind.....18 kts.

Find the ground roll for takeoff under the given conditions.

1—1,050 ft.
2—1,017 ft.
3—834 ft.
4—814 ft.

2218. Refer to Figure 19.
GIVEN:

Weight.....3,700 lb.
Pressure altitude.....1,000 ft.
Temperature.....12° C
Tailwind.....10 kts.

Find the ground roll for takeoff under the given conditions.

1—1,120 ft.
2—1,232 ft.
3—1,100 ft.
4—1,568 ft.

TAKEOFF DISTANCE

MAXIMUM WEIGHT 4000 LBS

SHORT FIELD

CONDITIONS:
Flaps 10°
2700 RPM, 36.5 Inches Hg, and Mixture Set at 186 PPH Prior to Brake Release.
Cowl Flaps Open
Paved, Level, Dry Runway
Zero Wind

NOTES:
1. Short field technique.
2. Decrease distances 10% for each 10 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2.5 knots.
3. For operation on a dry, grass runway, increase distances by 15% of the "ground roll" figure.

WEIGHT LBS	TAKEOFF SPEED KIAS		PRESS ALT FT	0°C		10°C		20°C		30°C		40°C	
	LIFT OFF	AT 50 FT		GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS
4000	72	78	S.L.	1140	1885	1245	2065	1360	2265	1485	2490	1620	2755
			1000	1215	1995	1325	2185	1445	2400	1580	2650	1730	2930
			2000	1290	2115	1410	2320	1540	2555	1685	2820	1845	3125
			3000	1375	2245	1505	2465	1645	2715	1795	3000	1970	3340
			4000	1465	2380	1605	2620	1755	2890	1920	3200	2100	3570
			5000	1565	2530	1710	2790	1870	3080	2050	3420	2245	3820
			6000	1670	2695	1825	2970	2000	3285	2190	3655	2405	4095
			7000	1785	2865	1950	3165	2140	3510	2345	3915	2575	4400
			8000	1905	3055	2085	3380	2290	3755	2510	4195	2760	4735

Figure 18

TAKEOFF DISTANCE
3700 LBS AND 3400 LBS
SHORT FIELD

CONDITIONS:
Flaps 10°
2700 RPM, 36.5 Inches Hg, and Mixture Set at 186 PPH Prior to Brake Release.
Cowl Flaps Open
Paved, Level, Dry Runway
Zero Wind

NOTES:
1. Short field technique.
2. Decrease distances 10% for each 10 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2.5 knots.
3. For operation on a dry, grass runway, increase distances by 15% of the "ground roll" figure.

WEIGHT LBS	TAKEOFF SPEED KIAS		PRESS ALT FT	0°C		10°C		20°C		30°C		40°C	
	LIFT OFF	AT 50 FT		GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS
3700	69	75	S.L.	950	1565	1035	1705	1125	1865	1230	2045	1340	2245
			1000	1010	1655	1100	1805	1200	1975	1310	2170	1430	2385
			2000	1075	1750	1170	1915	1275	2095	1395	2300	1525	2535
			3000	1145	1855	1245	2030	1360	2225	1485	2445	1625	2700
			4000	1215	1965	1330	2155	1450	2365	1585	2605	1735	2880
			5000	1300	2085	1420	2290	1550	2515	1695	2775	1855	3070
			6000	1385	2215	1515	2435	1655	2675	1810	2955	1980	3280
			7000	1480	2355	1615	2590	1770	2855	1935	3155	2120	3510
			8000	1580	2505	1725	2760	1890	3045	2070	3370	2270	3755
3400	66	72	S.L.	780	1290	850	1405	925	1530	1010	1670	1100	1830
			1000	830	1365	905	1485	985	1620	1075	1770	1170	1940
			2000	885	1440	965	1570	1050	1715	1145	1875	1250	2060
			3000	940	1525	1025	1665	1120	1820	1220	1990	1330	2185
			4000	1000	1615	1095	1765	1190	1930	1300	2115	1420	2325
			5000	1070	1715	1165	1870	1270	2050	1390	2250	1515	2475
			6000	1140	1815	1245	1985	1355	2180	1480	2390	1620	2635
			7000	1215	1930	1325	2110	1450	2315	1585	2550	1730	2815
			8000	1300	2050	1415	2245	1550	2465	1695	2715	1855	3005

Figure 19

2219. GIVEN:

Associated conditions ..... Fig. 20
Temperature ..... 30° F
Pressure altitude ..... 6,000 ft.
Weight ..... 3,300 lb.
Headwind ..... 20 kts.

What is the total takeoff distance over a 50–foot obstacle?

1—1,500 ft.
2—1,400 ft.
3—1,300 ft.
4—1,200 ft.

2220. GIVEN:

Associated conditions ..... Fig. 20
Temperature ..... 100° F
Pressure altitude ..... 4,000 ft.
Weight ..... 3,200 lb.
Wind ..... Calm

What is the ground roll required for takeoff over a 50–foot obstacle?

1—1,850 ft.
2—1,540 ft.
3—1,350 ft.
4—1,180 ft.

2221. GIVEN:

Associated conditions ..... Fig. 20
Temperature ..... 50° F
Pressure altitude ..... Sea level
Weight ..... 2,700 lb.
Wind ..... Calm

What is the total takeoff distance over a 50–foot obstacle?

1—750 ft.
2—650 ft.
3—550 ft.
4—450 ft.

2222. GIVEN:

Associated conditions ..... Fig. 20
Temperature ..... 75° F
Pressure altitude ..... 6,000 ft.
Weight ..... 2,900 lb.
Headwind ..... 20 kts.

What weight reduction is necessary to take off over a 50–foot obstacle in 1,000 ft.?

1—400 lb.
2—300 lb.
3—200 lb.
4—100 lb.

2223. An airplane departs an airport under the following conditions:

Airport elevation ..... 900 ft.
To cruise at ..... 8,500 ft.
Rate of climb ..... 500 ft./min.
Average true airspeed ..... 130 kts.
True course ..... 220°
Average wind velocity ..... 300° at 30 kts.
Variation ..... 3°W
Deviation ..... –2°
Average fuel consumption ..... 14 gal./hr.

Determine the approximate time, compass heading, distance, and fuel consumed during the climb.

1—15 min., 242°, 31 NM, 3.5 gal.
2—15 min., 234°, 31 NM, 3.5 gal.
3—15 min., 234°, 26 NM, 3.9 gal.
4—12 min., 234°, 31 NM, 4.2 gal.

2224. An airplane departs an airport under the following conditions:

Airport elevation ..... 1,500 ft.
To cruise at ..... 9,500 ft.
Rate of climb ..... 500 ft./min.
Average true airspeed ..... 140 kts.
True course ..... 135°
Average wind velocity ..... 070° at 20 kts.
Variation ..... 5°E
Deviation ..... –3°
Average fuel consumption ..... 12 gal./hr.

Determine the approximate time, compass heading, distance, and fuel consumed during the climb.

1—14 min., 128°, 32 NM, 3.8 gal.
2—14 min., 128°, 35 NM, 3.2 gal.
3—16 min., 128°, 32 NM, 3.8 gal.
4—16 min., 120°, 35 NM, 3.2 gal.

2225. An airplane departs an airport under the following conditions:

Airport elevation ..... 2,300 ft.
To cruise at ..... 10,500 ft.
Rate of climb ..... 600 ft./min.
Average true airspeed ..... 130 kts.
True course ..... 305°
Average wind velocity ..... 260° at 25 kts.
Variation ..... 4°E
Deviation ..... +3°
Average fuel consumption ..... 13 gal./hr.

Determine the approximate time, compass heading, distance, and fuel consumed during the climb.

1—16 min., 296°, 23 NM, 3.0 gal.
2—16 min., 296°, 25 NM, 3.4 gal.
3—14 min., 296°, 25 NM, 3.0 gal.
4—16 min., 292°, 23 NM, 3.0 gal.

OBSTACLE TAKE-OFF

ASSOCIATED CONDITIONS:

POWER	TAKE-OFF POWER SET BEFORE BRAKE RELEASE
FLAPS	20°
RUNWAY	PAVED, LEVEL, DRY SURFACE
TAKE-OFF SPEED	IAS AS TABULATED

NOTE: GROUND ROLL IS APPROX. 73% OF TOTAL TAKE-OFF DISTANCE OVER A 50 FT OBSTACLE.

EXAMPLE:

OAT	75°F
PRESSURE ALTITUDE	4000 FT
TAKE-OFF WEIGHT	3100 LBS
HEAD WIND	20 KNOTS
TOTAL TAKE-OFF DISTANCE OVER A 50 FT OBSTACLE	1350 FT
GROUND ROLL (73% OF 1350)	986 FT
IAS TAKE-OFF SPEED	
LIFT-OFF	74 MPH
AT 50 FT	74 MPH

WEIGHT POUNDS	IAS TAKE-OFF SPEED (ASSUMES ZERO INSTR. ERROR)			
	LIFT-OFF		50 FEET	
	MPH	KNOTS	MPH	KNOTS
3400	77	67	77	67
3200	75	65	75	65
3000	72	63	72	63
2800	69	60	69	60
2600	66	57	66	57
2400	63	55	63	55

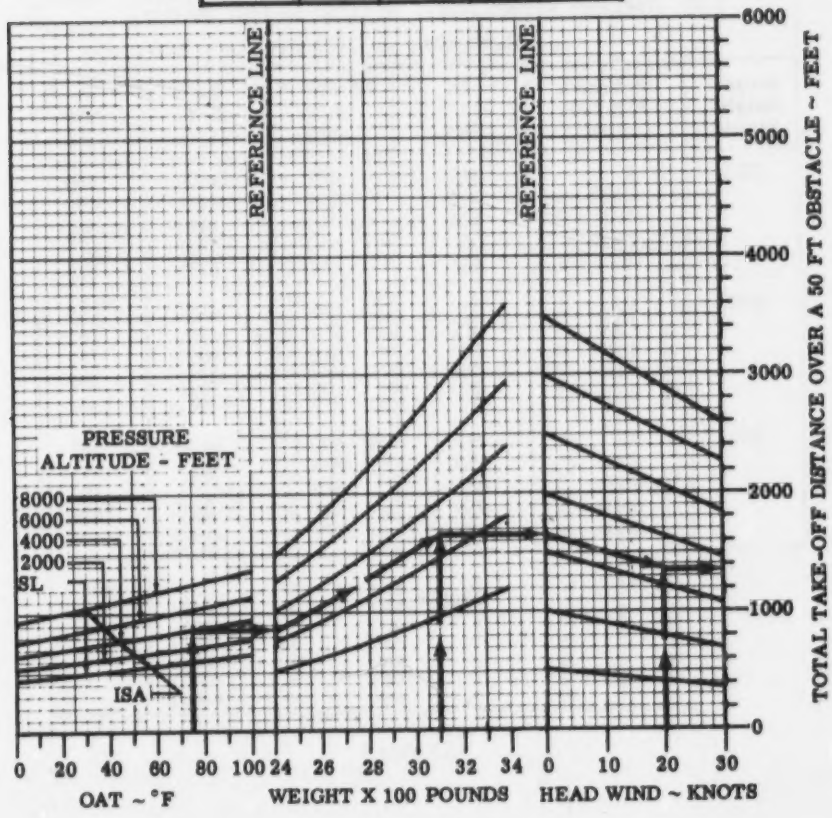


Figure 20

2226. The distance required to take off and clear a 50–foot obstacle is determined to be (see Figure 21)

Helicopter gross weight.....2,850 lb.
Pressure altitude.....7,000 ft.
Ambient temperature.....–15° C

1—1,002 ft.
2—1,070 ft.
3—1,183 ft.
4—1,364 ft.

2227. The distance required to take off and clear a 50–foot obstacle is determined to be (see Figure 21)

Helicopter gross weight.....2,500 lb.
Pressure altitude.....7,000 ft.
Ambient temperature.....+25° C

1—848 ft.
2—996 ft.
3—1,084 ft.
4—1,250 ft.

2228. The distance required to take off and clear a 50–foot obstacle is determined to be (see Figure 21)

Helicopter gross weight.....2,675 lb.
Pressure altitude.....3,000 ft.
Ambient temperature.....+25° C

1—829 ft.
2—861 ft.
3—881 ft.
4—894 ft.

2229. The distance required to take off and clear a 50–foot obstacle is determined to be (see Figure 21)

Takeoff gross weight.....2,325 lb.
Pressure altitude.....3,000 ft.
Ambient temperature.....+25° C

1—601 ft.
2—582 ft.
3—509 ft.
4—478 ft.

TAKE-OFF DISTANCE-FEET TO CLEAR 50 FOOT OBSTACLE
AT 50 MPH 3200 RPM

Gross Weight Pounds	Pressure Altitude Feet	At -13°F -25°C	At 23°F -5°C	At 59°F 15°C	At 95°F 35°C
2150	SL	373	401	430	458
	2000	400	434	461	491
	4000	428	462	494	527
	6000	461	510	585	677
	8000	567	674	779	896
2500	SL	531	569	613	652
	2000	568	614	660	701
	4000	611	660	709	759
	6000	654	727	848	986
	8000	811	975	1144	1355
2850	SL	743	806	864	929
	2000	770	876	929	1011
	4000	861	940	1017	1102
	6000	939	1064	1255	1538
	8000	1201	1527	-	-

Figure 21

2230. Refer to Figure 22.
GIVEN:

Weight.....3,400 lb.
Airport pressure altitude.....6,000 ft.
Temperature at 6,000 ft.....10° C

Using a maximum rate of climb under the given conditions, how much fuel would be used from engine start to a pressure altitude of 16,000 ft.?

1—43 lb.
2—46 lb.
3—45 lb.
4—48 lb.

2231. Refer to Figure 22.
GIVEN:

Weight.....4,000 lb.
Airport pressure altitude.....2,000 ft.
Temperature at 2,000 ft.....32° C

Using a maximum rate of climb under the given conditions, how much time would be required to climb to a pressure altitude of 8,000 ft.?

1—12 min.
2—8.4 min.
3—7 min.
4—11.2 min.

TIME, FUEL, AND DISTANCE TO CLIMB

MAXIMUM RATE OF CLIMB

CONDITIONS:
Flaps Up
Gear Up
2600 RPM
Cowl Flaps Open
Standard Temperature

PRESS ALT	MP	PPH
S.L. to 17,000	35	162
18,000	34	156
20,000	32	144
22,000	30	132
24,000	28	120

NOTES:
1. Add 16 pounds of fuel for engine start, taxi and takeoff allowance.
2. Increase time, fuel and distance by 10% for each 10°C above standard temperature.
3. Distances shown are based on zero wind.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB FPM	FROM SEA LEVEL		
				TIME MIN	FUEL USED POUNDS	DISTANCE NM
4000	S.L.	100	930	0	0	0
	4000	100	890	4	12	7
	8000	100	845	9	24	16
	12,000	100	790	14	38	25
	16,000	100	720	19	52	36
	20,000	99	515	26	69	50
	24,000	97	270	37	92	74
3700	S.L.	99	1060	0	0	0
	4000	99	1020	4	10	6
	8000	99	975	8	21	13
	12,000	99	915	12	33	21
	16,000	99	845	17	45	30
	20,000	97	630	22	59	42
	24,000	95	370	30	77	60
3400	S.L.	97	1205	0	0	0
	4000	97	1165	3	9	5
	8000	97	1120	7	19	12
	12,000	97	1060	11	29	18
	16,000	97	985	15	39	26
	20,000	96	760	19	51	36
	24,000	94	485	26	65	50

Figure 22

2232. Refer to Figure 23.
GIVEN:

Weight.....3,700 lb.
Airport pressure altitude.....4,000 ft.
Temperature at 4,000 ft.....21° C

Using a normal climb under the given conditions, how much fuel would be used from engine start to a pressure altitude of 12,000 ft.?

1—25 lb.
2—30 lb.
3—37 lb.
4—46 lb.

2233. Refer to Figure 23.
GIVEN:

Weight.....3,400 lb.
Airport pressure altitude.....4,000 ft.
Temperature at 4,000 ft.....14° C

Using a normal climb under the given conditions, how much time would be required to climb to a pressure altitude of 8,000 ft.?

1—10 min.
2—5 min.
3—5.5 min.
4—4.8 min.

TIME, FUEL, AND DISTANCE TO CLIMB

NORMAL CLIMB - 110 KIAS

CONDITIONS:
Flaps Up
Gear Up
2500 RPM
30 Inches Hg
120 PPH Fuel Flow
Cowl Flaps Open
Standard Temperature

NOTES:
1. Add 16 pounds of fuel for engine start, taxi and takeoff allowance.
2. Increase time, fuel and distance by 10% for each 7°C above standard temperature.
3. Distances shown are based on zero wind.

WEIGHT LBS	PRESS ALT FT	RATE OF CLIMB FPM	FROM SEA LEVEL		
			TIME MIN	FUEL USED POUNDS	DISTANCE NM
4000	S.L.	605	0	0	0
	4000	570	7	14	13
	8000	530	14	28	27
	12,000	485	22	44	43
	16,000	430	31	62	63
	20,000	365	41	82	87
3700	S.L.	700	0	0	0
	4000	665	6	12	11
	8000	625	12	24	23
	12,000	580	19	37	37
	16,000	525	26	52	53
	20,000	460	34	68	72
3400	S.L.	810	0	0	0
	4000	775	5	10	9
	8000	735	10	21	20
	12,000	690	16	32	31
	16,000	635	22	44	45
	20,000	565	29	57	61

Figure 23

2234. Refer to Figure 24.
GIVEN:

Airport pressure altitude ..... 4,000 ft.
Airport temperature ..... 12° C
Cruise pressure altitude ..... 9,000 ft.
Cruise temperature ..... -4° C

What will be the distance required to climb to cruise altitude under the given conditions?

1—3.5 miles.
2—6 miles.
3—8.5 miles.
4—11 miles.

2235. Refer to Figure 24.
GIVEN:

Airport pressure altitude ..... 3,000 ft.
Airport temperature ..... 30° C
Cruise pressure altitude ..... 16,000 ft.
Cruise temperature ..... 2° C

How long will it take to climb to cruise altitude under the given conditions?

1—9 min.
2—18 min.
3—20.5 min.
4—25 min.

2236. Refer to Figure 24.
GIVEN:

Airport pressure altitude ..... 2,000 ft.
Airport temperature ..... 20° C
Cruise pressure altitude ..... 10,000 ft.
Cruise temperature ..... 0° C

What will be the fuel, time, and distance required to climb to cruise altitude under the given conditions?

1—5 gal., 9 min., 13 NM.
2—6 gal., 11 min., 16 NM.
3—5 gal., 11 min., 15 NM.
4—7 gal., 12 min., 18 NM.

2237. Refer to Figure 24.
GIVEN:

Airport pressure altitude ..... 5,200 ft.
Airport temperature ..... 20° C
Cruise pressure altitude ..... 8,000 ft.
Cruise temperature ..... 15° C

What will be the fuel, time, and distance required to climb to cruise altitude under the given conditions?

1—3 gal., 5.5 min., 8 miles.
2—5 gal., 9 min., 13 miles.
3—8 gal., 14 min., 21 miles.
4—2 gal., 3.5 min., 5 miles.

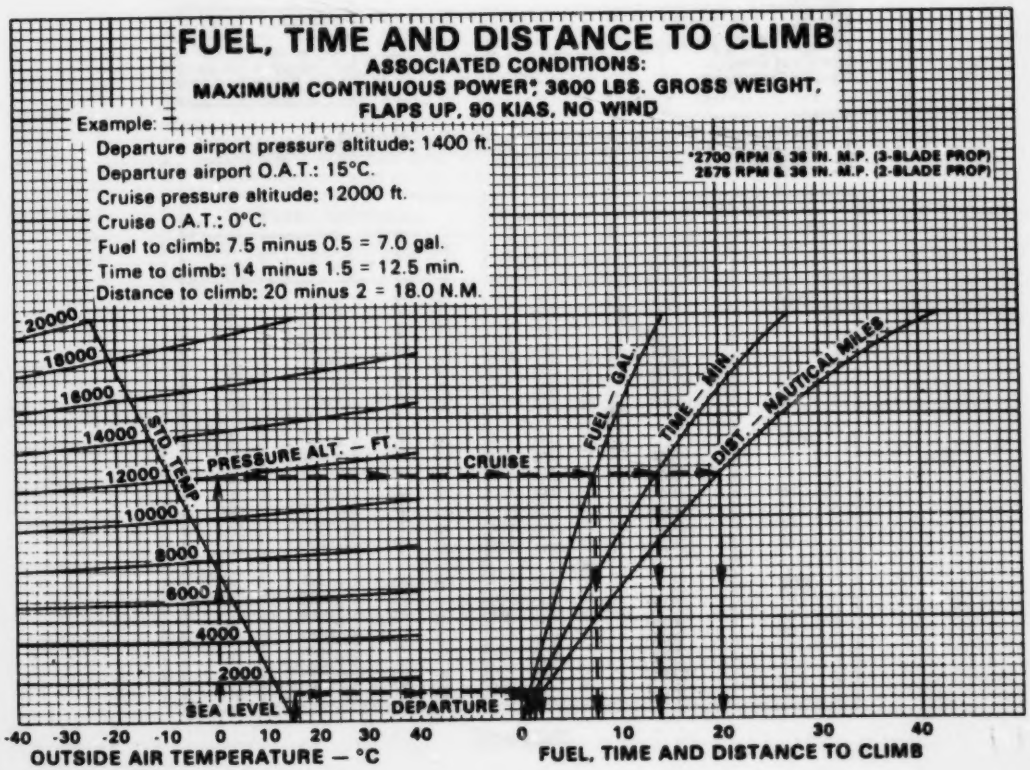


Figure 24

2238. Using a normal climb, how much fuel would be used from engine start to 12,000 ft. pressure altitude? (See Figure 25.)

Weight.....3,800 lb.
Airport pressure altitude.....4,000 ft.
Temperature.....26° C

1—39 lb.
2—46 lb.
3—51 lb.
4—58 lb.

2239. Using a normal climb, how much fuel would be used from engine start to 10,000 ft. pressure altitude? (See Figure 25.)

Weight.....3,500 lb.
Airport pressure altitude.....4,000 ft.
Temperature.....21° C

1—35 lb.
2—31 lb.
3—23 lb.
4—20 lb.

2240. Using a normal climb, how much fuel would be used from engine start to 8,000 ft. pressure altitude? (See Figure 25.)

Weight.....3,800 lb.
Airport pressure altitude.....2,000 ft.
Temperature.....28° C

1—21 lb.
2—24 lb.
3—27 lb.
4—36 lb.

TIME, FUEL, AND DISTANCE TO CLIMB

NORMAL CLIMB - 100 KIAS

CONDITIONS:
Flaps Up
Gear Up
2550 RPM
25 Inches MP or Full Throttle
Cowl Flaps Open
Standard Temperature

MIXTURE SETTING	
PRESS ALT	PPH
S.L. to 4000	108
8000	96
12,000	84

NOTES:
1. Add 12 pounds of fuel for engine start, taxi and takeoff allowance.
2. Increase time, fuel and distance by 10% for each 10°C above standard temperature.
3. Distances shown are based on zero wind.

WEIGHT LBS	PRESS ALT FT	RATE OF CLIMB FPM	FROM SEA LEVEL		
			TIME MIN	FUEL USED POUNDS	DISTANCE NM
3800	S.L.	580	0	0	0
	2000	580	3	6	6
	4000	570	7	12	12
	6000	470	11	19	19
	8000	365	16	27	28
	10,000	265	22	37	40
	12,000	165	32	51	59
3500	S.L.	685	0	0	0
	2000	685	3	5	5
	4000	675	6	11	10
	6000	565	9	16	16
	8000	455	13	23	23
	10,000	350	18	31	33
	12,000	240	25	41	46
3200	S.L.	800	0	0	0
	2000	800	2	4	4
	4000	795	5	9	8
	6000	675	8	14	13
	8000	560	11	19	19
	10,000	445	15	25	27
	12,000	325	20	33	37

Figure 25

2241. Using a maximum rate of climb, how much fuel would be used from engine start to 6,000 ft. pressure altitude? (See Figure 26.)

Weight.....3,200 lb.
Airport pressure altitude.....2,000 ft.
Temperature.....27° C

1—10 lb.
2—24 lb.
3—14 lb.
4—12 lb.

2242. Using a maximum rate of climb, how much fuel would be used from engine start to 10,000 ft. pressure altitude? (See Figure 26.)

Weight.....3,800 lb.
Airport pressure altitude.....4,000 ft.
Temperature.....30° C

1—23 lb.
2—28 lb.
3—35 lb.
4—40 lb.

2243. Using a maximum rate of climb, how much fuel would be used from engine start to 12,000 ft. pressure altitude? (See Figure 26.)

Weight.....3,500 lb.
Airport pressure altitude.....2,000 ft.
Temperature.....19° C

1—48 lb.
2—38 lb.
3—35 lb.
4—33 lb.

TIME, FUEL, AND DISTANCE TO CLIMB

MAXIMUM RATE OF CLIMB

CONDITIONS:
Flaps Up
Gear Up
2700 RPM
Full Throttle
Mixture Set at Placard Fuel Flow
Cowl Flaps Open
Standard Temperature

MIXTURE SETTING	
PRESS ALT	PPH
S.L.	138
4000	126
8000	114
12,000	102

NOTES:
1. Add 12 pounds of fuel for engine start, taxi and takeoff allowance.
2. Increase time, fuel and distance by 10% for each 10°C above standard temperature.
3. Distances shown are based on zero wind.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB FPM	FROM SEA LEVEL		
				TIME MIN	FUEL USED POUNDS	DISTANCE NM
3800	S.L.	97	860	0	0	0
	2000	95	760	2	6	4
	4000	94	660	5	12	9
	6000	93	565	9	18	14
	8000	91	465	13	26	21
	10,000	90	365	18	35	29
	12,000	89	265	24	47	41
3500	S.L.	95	990	0	0	0
	2000	94	885	2	5	3
	4000	93	780	5	10	7
	6000	91	675	7	16	12
	8000	90	570	11	22	17
	10,000	89	465	15	29	24
	12,000	87	360	20	38	32
3200	S.L.	94	1135	0	0	0
	2000	92	1020	2	4	3
	4000	91	910	4	9	6
	6000	90	800	6	14	10
	8000	88	685	9	19	14
	10,000	87	575	12	25	20
	12,000	86	465	16	32	26

Figure 26

2244. Refer to Figure 27.
GIVEN:

Weight.....3,400 lb.
Pressure Altitude.....7,000 ft.
Temperature.....15° C

What is the maximum rate of climb under the given conditions?

1—982 ft./min.
2—955 ft./min.
3—1,021 ft./min.
4—905 ft./min.

2245. Refer to Figure 27.
GIVEN:

Weight.....4,000 lb.
Pressure Altitude.....5,000 ft.
Temperature.....30° C

What is the maximum rate of climb under the given conditions?

1—630 ft./min.
2—655 ft./min.
3—774 ft./min.
4—702 ft./min.

2246. Refer to Figure 27.
GIVEN:

Weight.....3,700 lb.
Pressure Altitude.....22,000 ft.
Temperature.....–10° C

What is the maximum rate of climb under the given conditions?

1—384 ft./min.
2—320 ft./min.
3—305 ft./min.
4—457 ft./min.

2247. Refer to Figure 27.
GIVEN:

Weight.....4,000 lb.
Pressure Altitude.....11,000 ft.
Temperature.....20° C

What is the maximum rate of climb under the given conditions?

1—695 ft./min.
2—642 ft./min.
3—616 ft./min.
4—590 ft./min.

MAXIMUM RATE OF CLIMB

CONDITIONS:
Flaps Up
Gear Up
2600 RPM
Cowl Flaps Open

PRESS ALT	MP	PPH
S.L. to 17,000	36	182
18,000	34	156
20,000	32	144
22,000	30	132
24,000	28	120

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB - FPM			
			-20°C	0°C	20°C	40°C
4000	S.L.	100	1170	1035	895	755
	4000	100	1080	940	800	655
	8000	100	980	840	695	555
	12,000	100	870	730	590	---
	16,000	100	740	605	470	---
	20,000	99	485	355	---	---
	24,000	97	190	70	---	---
3700	S.L.	99	1310	1165	1020	875
	4000	99	1215	1070	925	775
	8000	99	1115	965	815	670
	12,000	99	1000	855	710	---
	16,000	99	865	730	590	---
	20,000	97	600	470	---	---
	24,000	95	295	170	---	---
3400	S.L.	97	1465	1320	1185	1015
	4000	97	1370	1220	1065	910
	8000	97	1265	1110	955	795
	12,000	97	1150	995	845	---
	16,000	97	1010	865	725	---
	20,000	96	730	585	---	---
	24,000	94	405	275	---	---

Figure 27

2248. Refer to Figure 28.
GIVEN:

Pressure altitude.....6,000 ft.
Temperature.....3° C
Power – 2200 RPM.....22" MP
Usable fuel available.....465 lb.

What is the maximum available flight time under the conditions stated?

1—6 hr. 27 min.
2—6 hr. 39 min.
3—6 hr. 56 min.
4—7 hr. 11 min.

2249. Refer to Figure 28.
GIVEN:

Pressure altitude.....6,000 ft.
Temperature.....–17° C
Power – 2300 RPM.....23" MP
Usable fuel available.....370 lb.

What is the maximum available flight time under the conditions stated?

1—4 hr. 20 min.
2—4 hr. 30 min.
3—4 hr. 40 min.
4—4 hr. 50 min.

2250. Refer to Figure 28.
GIVEN:

Pressure altitude.....6,000 ft.
Temperature.....–17° C
Power – 2400 RPM.....23" MP
Usable fuel available.....505 lb.

What is the maximum available flight time under the conditions stated?

1—5 hr. 48 min.
2—6 hr.
3—6 hr. 12 min.
4—6 hr. 21 min.

2251. Refer to Figure 28.
GIVEN:

Pressure altitude.....6,000 ft.
Temperature.....13° C
Power – 2500 RPM.....23" MP
Usable fuel available.....460 lb.

What is the maximum available flight time under the conditions stated?

1—4 hr. 46 min.
2—4 hr. 58 min.
3—5 hr. 7 min.
4—5 hr. 12 min.

CRUISE PERFORMANCE

PRESSURE ALTITUDE 6000 FEET

CONDITIONS:
Recommended Lean Mixture
3800 Pounds
Cowl Flaps Closed

		20°C BELOW STANDARD TEMP -17°C			STANDARD TEMPERATURE 3°C			20°C ABOVE STANDARD TEMP 23°C		
RPM	MP	% BHP	KTAS	PPH	% BHP	KTAS	PPH	% BHP	KTAS	PPH
2550	24	- - -	- - -	- - -	78	173	97	75	174	94
	23	76	167	96	74	169	92	71	171	89
	22	72	164	90	69	166	87	67	167	84
	21	68	160	85	65	162	82	63	163	80
2500	24	78	169	98	75	171	95	73	172	91
	23	74	166	93	71	167	90	69	169	87
	22	70	162	88	67	164	85	65	165	82
	21	66	158	83	63	160	80	61	160	77
2400	24	73	165	91	70	166	88	68	167	85
	23	69	161	87	67	163	84	64	164	81
	22	65	158	82	63	159	79	61	160	77
	21	61	154	77	59	155	75	57	155	73
2300	24	68	161	86	66	162	83	64	163	80
	23	65	158	82	62	159	79	60	159	76
	22	61	154	77	59	155	75	57	155	72
	21	57	150	73	55	150	71	53	150	68
2200	24	63	156	80	61	157	77	59	158	75
	23	60	152	76	58	153	73	56	154	71
	22	57	149	72	54	149	70	53	149	67
	21	53	144	68	51	144	66	49	143	64
	20	50	139	64	48	138	62	46	137	60
	19	46	133	60	44	132	58	43	131	57

Figure 28

2252. What is the approximate time required to climb from 2,000 ft. to 10,000 ft.? (See Figure 29.)

Weight.....2,700 lb.
Rate of climb.....use average value

1—6 min. 25 sec.
2—5 min. 45 sec.
3—5 min. 10 sec.
4—4 min. 30 sec.

2253. What is the approximate time required to climb from 4,000 ft. to 8,000 ft.? (See Figure 29.)

Weight.....3,000 lb.
Rate of climb.....use average value

1—4 min. 30 sec.
2—2 min. 50 sec.
3—3 min. 20 sec.
4—3 min. 50 sec.

2254. What is the approximate time required to climb from 4,000 ft. to 10,000 ft.? (See Figure 29.)

Weight.....3,400 lb.
Rate of climb.....use average value

1—9 min. 23 sec.
2—7 min. 38 sec.
3—7 min. 54 sec.
4—8 min. 20 sec.

2255. What is the approximate time required to climb from 3,000 ft. to 12,000 ft.? (See Figure 29.)

Weight.....2,400 lb.
Rate of climb.....use average value

1—6 min. 15 sec.
2—4 min. 40 sec.
3—5 min. 10 sec.
4—5 min. 38 sec.

2256. At what altitude would the service ceiling (rate of climb 100 ft./min.) be reached with a weight of 3,000 pounds? (See Figure 29.)

1—21,200 feet.
2—20,900 feet.
3—20,600 feet.
4—20,300 feet.

2257. At what altitude would the service ceiling (rate of climb 100 ft./min.) be reached with a weight of 3,400 pounds? (See Figure 29.)

1—16,600 feet.
2—17,800 feet.
3—17,000 feet.
4—17,400 feet.

2258. At what altitude would the service ceiling (rate of climb 100 ft./min.) be reached with a weight of 2,400 pounds? (See Figure 29.)

1—26,600 feet.
2—25,800 feet.
3—25,400 feet.
4—25,000 feet.

2259. At what altitude would the service ceiling (rate of climb 100 ft./min.) be reached with a weight of 2,700 pounds? (See Figure 29.)

1—24,000 feet.
2—23,700 feet.
3—23,300 feet.
4—22,350 feet.

MAXIMUM CLIMB

RATE OF CLIMB

ASSOCIATED CONDITIONS:

POWER	MAXIMUM CONTINUOUS
FLAPS	UP
GEAR	UP
AIRSPEED	BEST RATE-OF-CLIMB SPEED

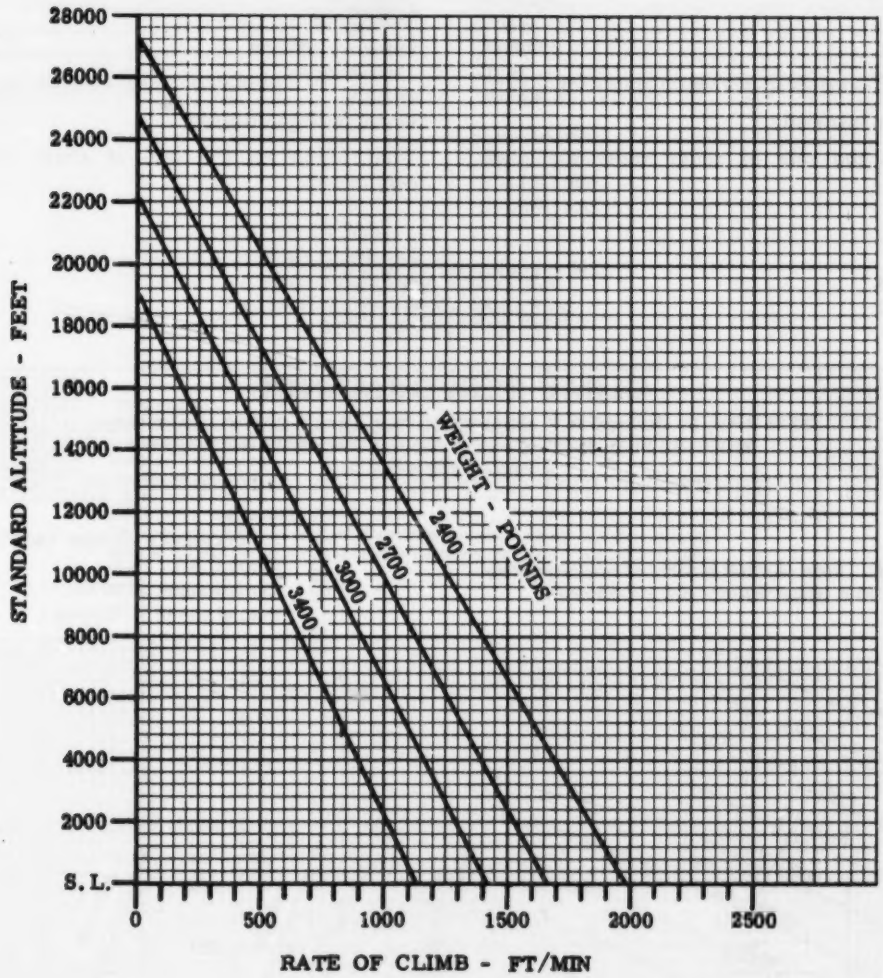


Figure 29

2260. Refer to Figure 30.
GIVEN:

Pressure altitude.....1,500 ft.
Temperature.....30° C
Weight.....3,000 lb.
Wheel fairings installed

What would be the rate of climb under the given conditions?

1—1,110 ft./min.
2—1,230 ft./min.
3—1,345 ft./min.
4—1,300 ft./min.

2261. Refer to Figure 30.
GIVEN:

Pressure altitude.....6,000 ft.
Temperature.....8° C
Weight.....3,400 lb.
Wheel fairings not installed

What would be the rate of climb under the given conditions?

1—810 ft./min.
2—980 ft./min.
3—1,005 ft./min.
4—1,100 ft./min.

2262. Refer to Figure 30.
GIVEN:

Pressure altitude.....2,000 ft.
Temperature.....18° C
Weight.....3,300 lb.
Wheel fairings not installed

What would be the rate of climb under the given conditions?

1—1,145 ft./min.
2—1,080 ft./min.
3—960 ft./min.
4—890 ft./min.

2263. Refer to Figure 30.
GIVEN:

Pressure altitude.....4,000 ft.
Temperature.....20° C
Weight.....3,600 lb.
Wheel fairings installed

What would be the rate of climb under the given conditions?

1—850 ft./min.
2—940 ft./min.
3—960 ft./min.
4—1,010 ft./min.

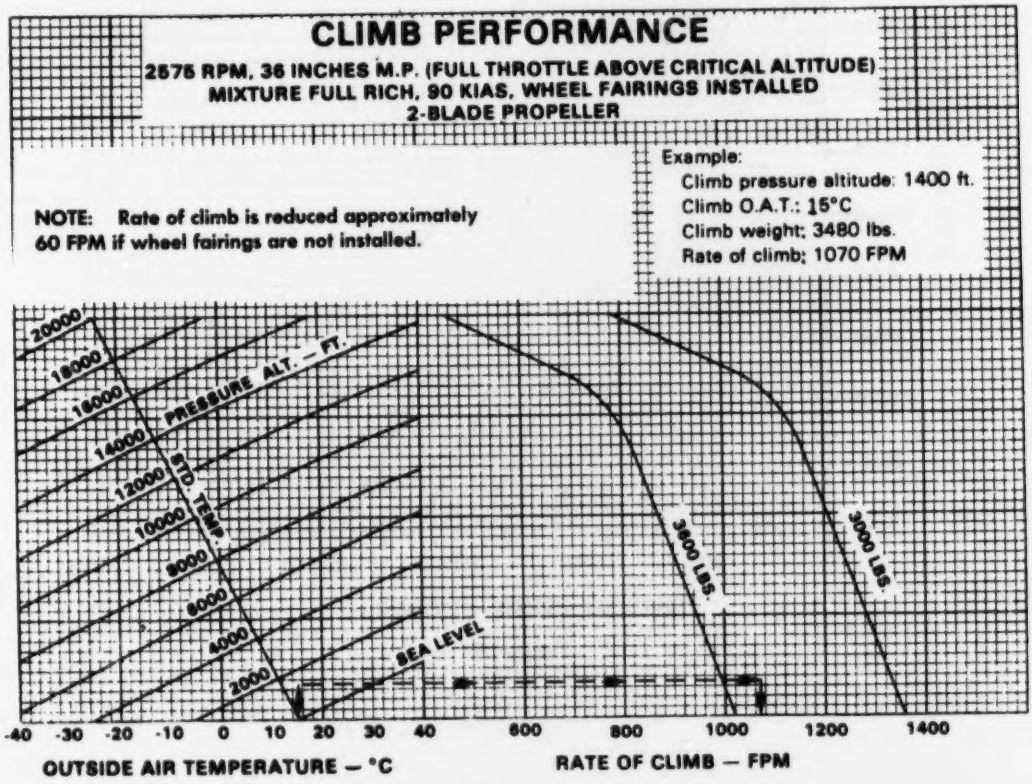


Figure 30

2264. Refer to Figure 31.
GIVEN:

Altitude.....10,000 ft.
Power.....80 percent
Headwind.....12 kts.

What is the range under the given conditions?

1—687 NM.
2—638 NM.
3—604 NM.
4—592 NM.

2265. Refer to Figure 31.
GIVEN:

Altitude.....4,200 ft.
Power.....60 percent
Headwind.....15 kts.

What is the range under the given conditions?

1—682 NM.
2—705 NM.
3—720 NM.
4—740 NM.

2266. Refer to Figure 31.
GIVEN:

Altitude.....6,500 ft.
Power.....70 percent
Headwind.....20 kts.

What is the range under the given conditions?

1—648 NM.
2—594 NM.
3—742 NM.
4—637 NM.

2267. Refer to Figure 31.
GIVEN:

Altitude.....7,000 ft.
Power.....50 percent
Tailwind.....18 kts.

What is the range under the given conditions?

1—754 NM.
2—872 NM.
3—890 NM.
4—990 NM.

RANGE PROFILE
45 MINUTES RESERVE
522 LBS. USABLE FUEL

CONDITIONS:
4000 Pounds
Recommended Lean Mixture for Cruise
Standard Temperature
Zero Wind

NOTE:
This chart allows for the fuel used for engine start, taxi, takeoff and climb and the distance during a normal climb up to 20,000 feet and maximum climb above 20,000 feet.

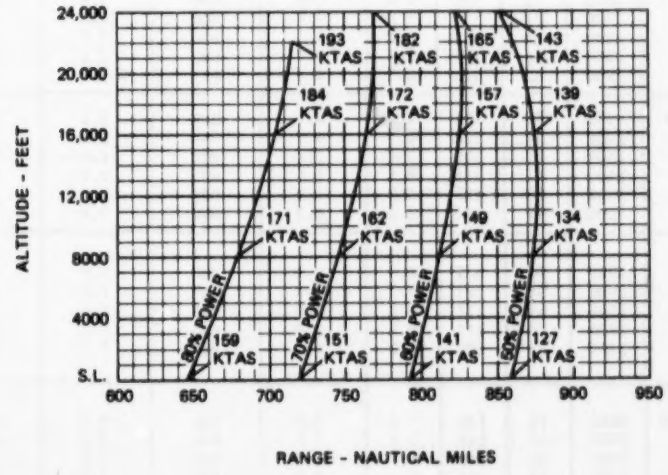


Figure 31

2268. Which maximum range factor decreases as weight decreases?

1—Specific range.
2—Maximum range angle of attack.
3—Maximum range altitude.
4—Maximum range airspeed.

2269. If the cruise altitude is 7,500 feet, using 64 percent power at 2500 RPM, what would be the range with 48 gallons of usable fuel? (See Figure 32.)

1—685 miles.
2—635 miles.
3—810 miles.
4—645 miles.

2270. With the conditions shown in Figure 32, what would be the endurance at an altitude of 7,500 feet, using 52 percent power?

NOTE: With 48 gallons fuel – no reserve.

1—8.4 hours.
2—8.0 hours.
3—7.7 hours.
4—6.1 hours.

2271. While cruising at 2,500 feet, using 58 percent BHP and 2300 RPM, how long could the airplane be flown with 48 gallons of usable fuel aboard? (See Figure 32.)

1—7.7 hours.
2—7.2 hours.
3—6.1 hours.
4—5.7 hours.

2272. What would be the approximate true airspeed and fuel consumption per hour at an altitude of 7,500 feet, using 52 percent power? (See Figure 32.)

1—105 MPH TAS, 6.2 GPH.
2—100 MPH TAS, 7.4 GPH.
3—118 MPH TAS, 6.9 GPH.
4—113 MPH TAS, 6.7 GPH.

2273. With the conditions shown in Figure 32, what would be the approximate true airspeed and fuel consumption per hour at an altitude of 5,000 feet, using 55 percent power?

1—100 MPH TAS, 6.0 GPH.
2—108 MPH TAS, 6.5 GPH.
3—116 MPH TAS, 6.9 GPH.
4—111 MPH TAS, 7.4 GPH.

CRUISE & RANGE PERFORMANCE

Gross Weight- 2300 Lbs.
Standard Conditions
Zero Wind Lean Mixture

NOTE: Maximum cruise is normally limited to 75% power.

ALT.	RPM	% BHP	TAS MPH	GAL / HOUR	38 GAL (NO RESERVE) ENDR. HOURS	38 GAL (NO RESERVE) RANGE MILES	48 GAL (NO RESERVE) ENDR. HOURS	48 GAL (NO RESERVE) RANGE MILES
2500	2700	86	134	9.7	3.9	525	4.9	660
	2600	79	129	8.6	4.4	570	5.6	720
	2500	72	123	7.8	4.9	600	6.2	760
	2400	65	117	7.2	5.3	620	6.7	780
	2300	58	111	6.7	5.7	630	7.2	795
	2200	52	103	6.3	6.1	625	7.7	790
5000	2700	82	134	9.0	4.2	565	5.3	710
	2600	75	128	8.1	4.7	600	5.9	760
	2500	68	122	7.4	5.1	625	6.4	790
	2400	61	116	6.9	5.5	635	6.9	805
	2300	55	108	6.5	5.9	635	7.4	805
	2200	49	100	6.0	6.3	630	7.9	795
7500	2700	78	133	8.4	4.5	600	5.7	755
	2600	71	127	7.7	4.9	625	6.2	790
	2500	64	121	7.1	5.3	645	6.7	810
	2400	58	113	6.7	5.7	645	7.2	820
	2300	52	105	6.2	6.1	640	7.7	810
10,000	2650	70	129	7.6	5.0	640	6.3	810
	2600	67	125	7.3	5.2	650	6.5	820
	2500	61	118	6.9	5.5	655	7.0	830
	2400	55	110	6.4	5.9	650	7.5	825
	2300	49	100	6.0	6.3	635	8.0	800

Figure 32

2274. When a pitot tube is clogged, which of these instruments would be affected?

1—Vertical-speed indicator.
2—Altimeter.
3—Airspeed indicator.
4—Turn needle.

2275. The pitot system provides impact pressure for only the

1—airspeed indicator, vertical-speed indicator, and altimeter.
2—altimeter and vertical-speed indicator.
3—vertical-speed indicator.
4—airspeed indicator.

2276. Pitot-static system errors are greatest in which range of airspeed?

1—Maneuvering speed.
2—High airspeed.
3—Low airspeed.
4—Cruising airspeed.

2277. When the CDI needle is centered during an omnireceiver check using a VOT, the omnibearing selector and the TO/FROM indicator should read

1—180° FROM, only if you are due north of the VOT.
2—0° TO or 180° FROM, regardless of your position from the VOT.
3—0° FROM or 180° TO, regardless of your position from the VOT.
4—0° TO, only if you are due south of the VOT.

2278. When using VOT to make a VOR receiver check, the CDI should be centered and the OBS should indicate that the aircraft is on the

1—090 radial.
2—180 radial.
3—270 radial.
4—360 radial.

2279. When checking the course sensitivity of a VOR receiver, how many degrees should the OBS be rotated to move the CDI from the center to the last dot on either side?

1—5° to 10°.
2—10° to 12°.
3—15° to 18°.
4—18° to 20°.

2280. To determine pressure altitude prior to takeoff, the altimeter should be set to

1—the density altitude corrected for nonstandard temperature.
2—the field elevation and the pressure reading in the altimeter setting window noted.
3—the current altimeter setting.
4—29.92″ Hg and the altimeter indication noted.

2281. What effect does an uphill runway slope have on takeoff performance?

1—Increases takeoff distance.
2—Increases takeoff speed.
3—Decreases takeoff distance.
4—Decreases takeoff speed.

2282. An airplane is flying at a constant flight level and at a power schedule which produces maximum air miles per pound of fuel. In this event, as the weight of the airplane is reduced, engine power setting or fuel flow is

1—held constant to simplify fuel consumption computations.
2—reduced to maintain the best constant airspeed.
3—reduced to maintain the best L/D ratio flight conditions.
4—increased to allow flight at maximum efficient airspeed relative to tailplane drag.

2283. Refer to Figure 33.
GIVEN:

Pressure Altitude ..... 18,000 ft.
Temperature ..... –21° C
Power ..... 2400 RPM — 28″ MP
Recommended lean mixture
Usable fuel ..... 425 lb.

What is the approximate flight time available under the given conditions? (Allow for VFR day fuel reserve.)

1—4 hr. 31 min.
2—4 hr. 1 min.
3—3 hr. 46 min.
4—3 hr. 2 min.

2284. Refer to Figure 33.
GIVEN:

Pressure Altitude ..... 18,000 ft.
Temperature ..... –41° C
Power ..... 2500 RPM — 26″ MP
Recommended lean mixture
Usable fuel ..... 318 lb.

What is the approximate flight time available under the given conditions? (Allow for VFR night fuel reserve.)

1—3 hr. 2 min.
2—3 hr. 12 min.
3—2 hr. 27 min.
4—3 hr. 42 min.

2285. Refer to Figure 33.
GIVEN:

Pressure Altitude ..... 18,000 ft.
Temperature ..... –1° C
Power ..... 2200 RPM — 20″ MP
Best fuel economy
Usable fuel ..... 344 lb.

What is the approximate flight time available under the given conditions? (Allow for VFR day fuel reserve.)

1—6 hr.
2—5 hr. 20 min.
3—5 hr. 5 min.
4—4 hr. 50 min.

2286. Refer to Figure 33.
GIVEN:

Pressure Altitude ..... 18,000 ft.
Temperature ..... –21° C
Power ..... 2300 RPM — 26″ MP
Recommended lean mixture
Usable fuel ..... 273 lb.

What is the approximate flight time available under the given conditions? (Allow for VFR night fuel reserve.)

1—2 hr. 40 min.
2—2 hr. 30 min.
3—2 hr. 25 min.
4—2 hr.

CRUISE PERFORMANCE

PRESSURE ALTITUDE 18,000 FEET

CONDITIONS:
4000 Pounds
Recommended Lean Mixture
Cowl Flaps Closed

NOTE
For best fuel economy at 70% power or less, operate at 6 PPH leaner than shown in this chart or at peak EGT.

		20°C BELOW STANDARD TEMP -41°C			STANDARD TEMPERATURE -21°C			20°C ABOVE STANDARD TEMP -1°C		
RPM	MP	% BHP	KTAS	PPH	% BHP	KTAS	PPH	% BHP	KTAS	PPH
2500	30	- - -	- - -	- - -	81	188	106	76	185	100
	28	80	184	105	76	182	99	71	178	93
	26	75	178	99	71	176	93	67	172	88
	24	70	171	91	66	168	86	62	164	81
	22	63	162	84	60	159	79	56	155	75
2400	30	81	185	107	77	183	101	72	180	94
	28	76	179	100	72	177	94	67	173	88
	26	71	172	93	67	170	88	63	166	83
	24	66	165	87	62	163	82	58	159	77
	22	61	158	80	57	155	76	54	150	72
2300	30	79	182	103	74	180	97	70	176	91
	28	74	176	97	70	174	91	65	170	86
	26	69	170	91	65	167	86	61	163	81
	24	64	162	84	60	159	79	56	155	75
	22	58	154	77	55	150	73	51	145	65
2200	26	66	166	87	62	163	82	58	159	77
	24	61	158	80	57	154	76	54	150	72
	22	55	148	73	51	144	69	48	138	66
	20	49	136	66	46	131	63	43	124	59

Figure 33

2287. If an airplane is at a standard altitude of 6,500 feet and the power is 60 percent, what is the brake horsepower and true airspeed? (See Figure 34.)

1—128 BHP and 154 MPH.
2—171 BHP and 186 MPH.
3—171 BHP and 197 MPH.
4—186 BHP and 175 MPH.

2288. Given the following conditions determine the brake horsepower and true airspeed. (See Figure 34.)

Weight.....3,400 lb.
Std. altitude.....10,500 ft.
Power.....50 percent

1—175 BHP and 175 MPH.
2—162 BHP and 175 MPH.
3—142 BHP and 162 MPH.
4—142 BHP and 175 MPH.

2289. Under the conditions given, what is the brake horsepower and true airspeed? (See Figure 34.)

Weight.....3,400 lb.
Std. altitude.....5,000 ft.
Power.....75 percent

1—200 BHP and 190 MPH.
2—214 BHP and 200 MPH.
3—200 BHP and 214 MPH.
4—214 BHP and 190 MPH.

2290. Under the conditions given, what is the brake horsepower and true airspeed? (See Figure 34.)

Weight.....3,400 lb.
Std. altitude.....8,500 ft.
Power.....55 percent

1—157 BHP and 181 MPH.
2—154 BHP and 172 MPH.
3—157 BHP and 169 MPH.
4—142 BHP and 181 MPH.

2291. Under the conditions given, what is the true airspeed? (See Figure 34.)

Weight.....3,400 lb.
Std. altitude.....9,500 ft.
Power (full throttle).....2100 RPM

1—185 MPH.
2—181 MPH.
3—175 MPH.
4—169 MPH.

2292. Under the conditions given, what is the true airspeed? (See Figure 34.)

Weight.....3,400 lb.
Std. altitude.....8,500 ft.
Power (full throttle).....2200 RPM

1—192 MPH.
2—188 MPH.
3—178 MPH.
4—175 MPH.

2293. An airplane is at a standard altitude of 9,500 feet and full throttle and 2300 RPM is being maintained. What is the true airspeed? (See Figure 34.)

1—175 MPH.
2—180 MPH.
3—191 MPH.
4—196 MPH.

2294. Under the conditions given, what is the true airspeed? (See Figure 34.)

Weight.....3,400 lb.
Std. altitude.....9,000 ft.
Power (full throttle).....2400 RPM

1—200 MPH.
2—196 MPH.
3—186 MPH.
4—180 MPH.

CRUISE OPERATION

WEIGHT 3400 LBS

NO.	% POWER	ENG SPEED RPM	BHP
1	45	2100	128
2	50	2100	142
3	55	2100	157
4	60	2200	171
5	65	2300	185
6	70	2400	200
7	75	2500	214

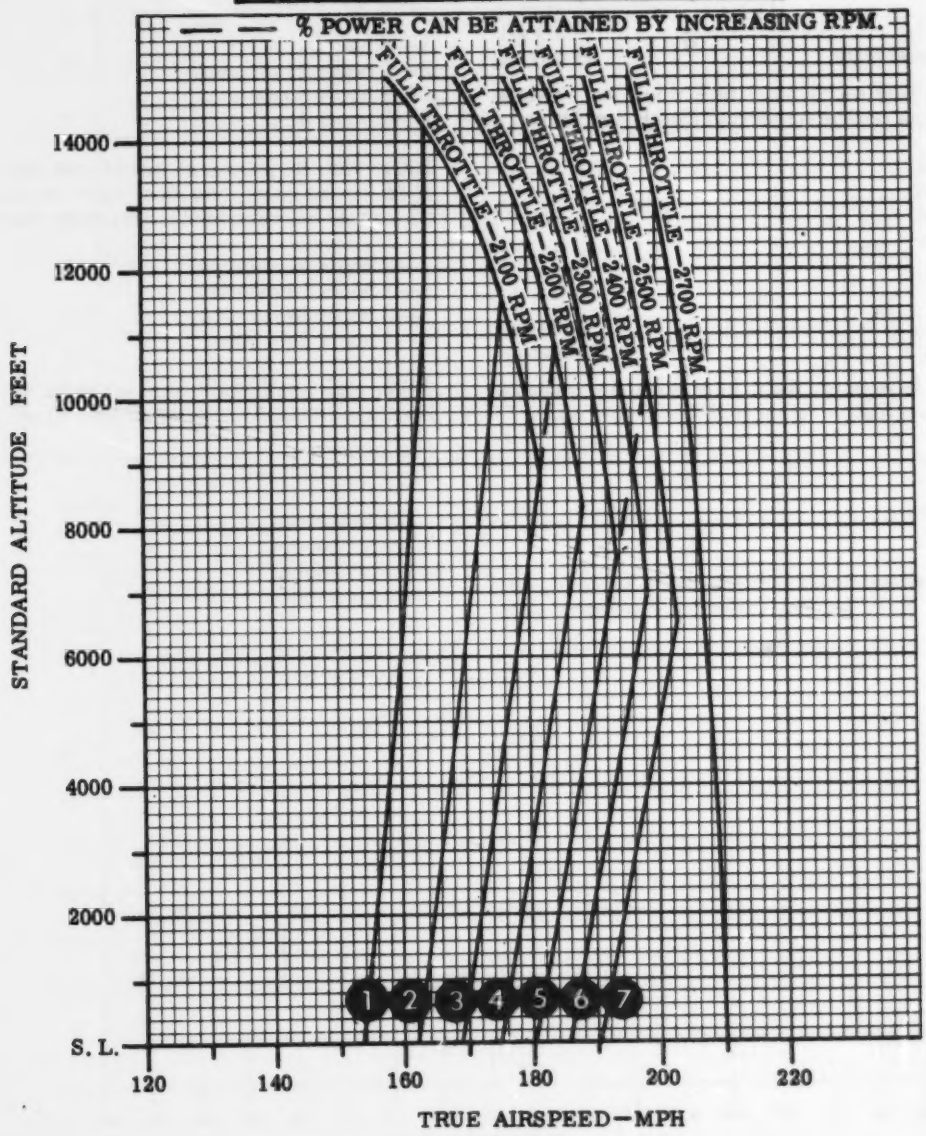


Figure 34

2295. GIVEN:

Fuel quantity.....47 gal.
Power – cruise (lean).....55 percent

Approximately how much flight time would be available with a 45–minute reserve remaining? (See Figure 35.)

1—4 hr. 6 min.
2—3 hr. 43 min.
3—3 hr. 22 min.
4—3 hr. 8 min.

2296. GIVEN:

Fuel quantity.....65 gal.
Best power – level flight.....55 percent

Approximately how much flight time would be available with a 30–minute reserve remaining? (See Figure 35.)

1—5 hr. 4 min.
2—4 hr. 30 min.
3—4 hr. 17 min.
4—4 hr. 6 min.

2297. GIVEN:

Fuel quantity.....42 gal.
Best power – level flight.....45 percent

Approximately how much flight time would be available with a 30–minute reserve remaining? (See Figure 35.)

1—3 hr. 54 min.
2—3 hr. 34 min.
3—3 hr. 14 min.
4—3 hr. 6 min.

2298. Approximately how much fuel would be consumed when climbing at 75 percent power for 7 minutes? (See Figure 35.)

1—2.6 gallons.
2—2.4 gallons.
3—2.1 gallons.
4—1.8 gallons.

2299. Determine the amount of fuel consumed during takeoff and climb at 70 percent power for 10 minutes. (See Figure 35.)

1—1.73 gallons.
2—2.87 gallons.
3—17.3 gallons.
4—28.9 gallons.

2300. With 56 gallons of fuel aboard and cruising (best power) at 70 percent power, how much flight time is available with a 30–minute fuel reserve still remaining. (See Figure 35.)

1—3 hours.
2—3 hours 21 minutes.
3—3 hours 30 minutes.
4—3 hours 41 minutes.

2301. With 38 gallons of fuel aboard and cruising (lean) at 55 percent power, how much flight time is available with a 45–minute fuel reserve still remaining. (See Figure 35.)

1—2 hours 34 minutes.
2—3 hours 18 minutes.
3—3 hours 38 minutes.
4—4 hours 3 minutes.

2302. How much flight time would be available and still have a 30–minute fuel reserve? (See Figure 35.)

Fuel quantity.....55 gal.
Power–cruise (lean).....65 percent

1—2 hr. 19 min.
2—2 hr. 49 min.
3—3 hr. 38 min.
4—4 hr. 5 min.

FUEL CONSUMPTION VS BRAKE HORSEPOWER

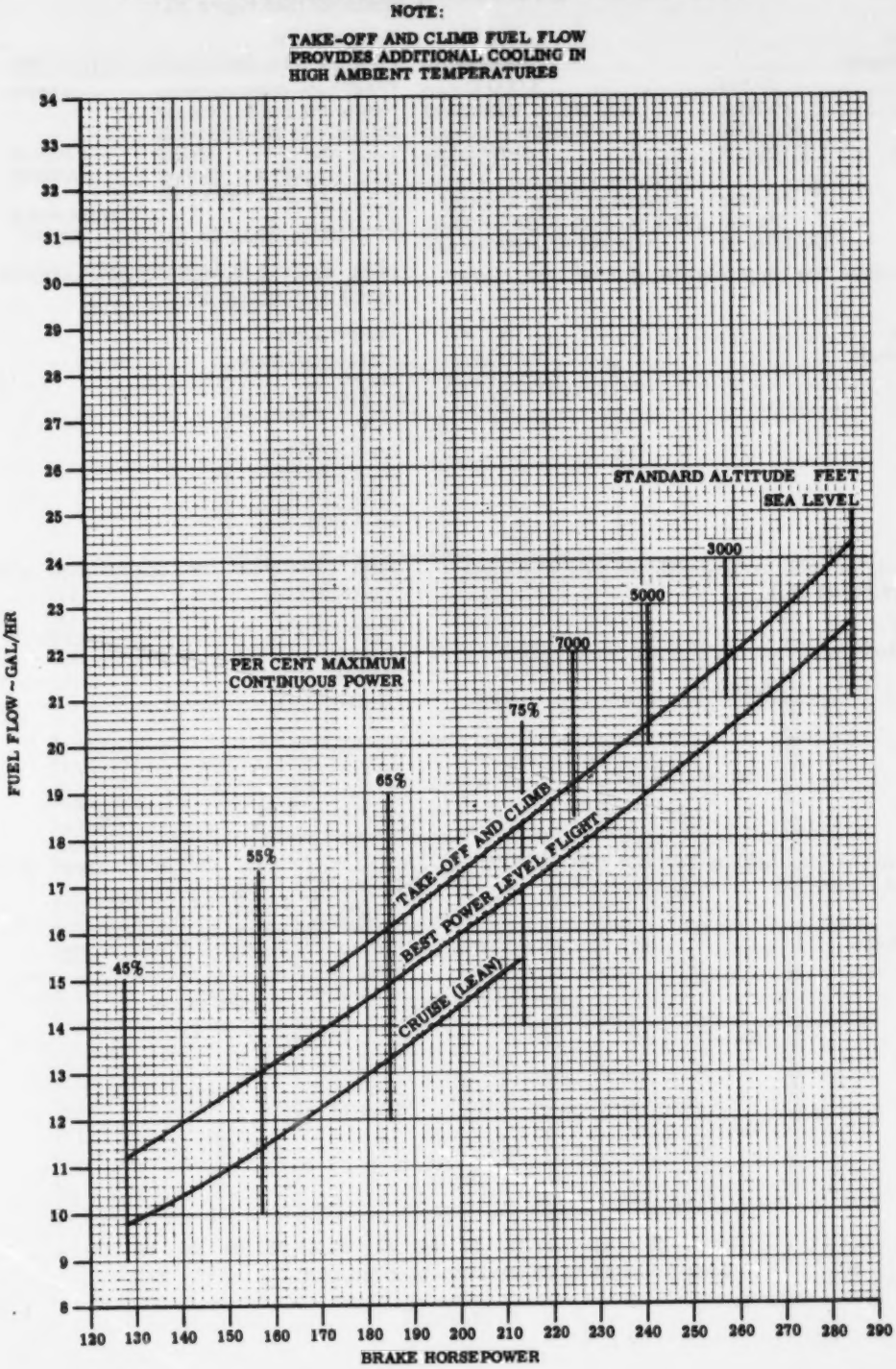


Figure 35

2303. Determine the approximate ground roll. (See Figure 36.)

Temperature.....50° F
Pressure altitude.....Sea level
Weight.....3,000 lb.
Headwind.....10 kts.

1—1,050 ft.
2—836 ft.
3—557 ft.
4—425 ft.

2304. Determine the approximate ground roll. (See Figure 36.)

Temperature.....60° F
Pressure altitude.....8,000 ft.
Weight.....3,200 lb.
Headwind.....18 kts.

1—1,500 ft.
2—1,050 ft.
3—795 ft.
4—650 ft.

2305. What is the total landing distance over a 50–foot obstacle? (See Figure 36.)

Temperature.....90° F
Pressure altitude.....2,000 ft.
Weight.....3,400 lb.
Headwind.....10 kts.

1—1,725 ft.
2—1,650 ft.
3—1,575 ft.
4—1,475 ft.

2306. What is the total landing distance over a 50–foot obstacle? (See Figure 36.)

Temperature.....90° F
Pressure altitude.....8,000 ft.
Weight.....3,400 lb.
Headwind.....6 kts.

1—1,900 ft.
2—1,825 ft.
3—1,750 ft.
4—1,700 ft.

2307. What is the total landing distance over a 50–foot obstacle? (See Figure 36.)

Temperature.....50° F
Pressure altitude.....4,000 ft.
Weight.....3,000 lb.
Headwind.....22 kts.

1—1,250 ft.
2—1,175 ft.
3—1,050 ft.
4—975 ft.

2308. What is the total landing distance over a 50–foot obstacle? (See Figure 36.)

Temperature.....80° F
Pressure altitude.....4,000 ft.
Weight.....2,800 lb.
Headwind.....24 kts.

1—1,325 ft.
2—1,250 ft.
3—1,125 ft.
4—1,000 ft.

2309. Determine the approximate ground roll. (See Figure 36.)

Temperature.....70° F
Pressure altitude.....Sea level
Weight.....3,400 lb.
Headwind.....16 kts.

1—1,275 ft.
2—883 ft.
3—676 ft.
4—542 ft.

2310. Determine the approximate ground roll. (See Figure 36.)

Temperature.....85° F
Pressure altitude.....6,000 ft.
Weight.....2,800 lb.
Headwind.....14 kts.

1—1,480 ft.
2—1,280 ft.
3—742 ft.
4—634 ft.

NORMAL LANDING

ASSOCIATED CONDITIONS:	
POWER	AS REQUIRED TO MAINTAIN 800 FT/MIN DESCENT ON APPROACH
FLAPS	DOWN
RUNWAY	PAVED, LEVEL, DRY SURFACE
APPROACH SPEED	IAS AS TABULATED

NOTE: GROUND ROLL IS APPROX. 53% OF TOTAL LANDING DISTANCE OVER A 50 FT OBSTACLE.

EXAMPLE:	
OAT	75° F.
PRESSURE ALTITUDE	4000 FT
LANDING WEIGHT	3200 LBS
HEAD WIND	10 KNOTS
TOTAL LANDING DISTANCE OVER A 50 FT OBSTACLE	1475 FT
GROUND ROLL (53% OF 1475)	782 FT
IAS APPROACH SPEED	87 MPH IAS

WEIGHT POUNDS	IAS APPROACH SPEED (ASSUMES ZERO INSTR. ERROR)	
	MPH	KNOTS
3400	90	78
3200	87	76
3000	84	73
2800	81	70
2600	78	68
2400	75	65

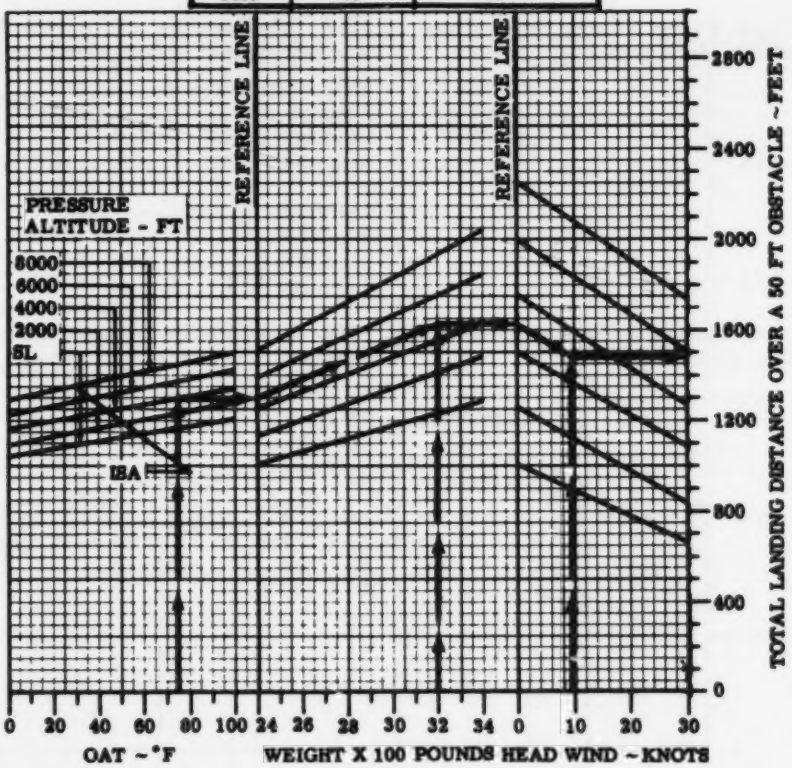


Figure 36

2311. Determine the approximate ground roll required after landing over a 50–foot obstacle. (See Figure 37.)

Ambient temperature.....85° F
Pressure altitude.....4,000 ft.
Landing weight.....3,200 lb.
Headwind.....25 kts.

1—438 ft.
2—537 ft.
3—975 ft.
4—1,512 ft.

2312. Determine the approximate ground roll required after landing over a 50–foot obstacle. (See Figure 37.)

Ambient temperature.....75° F
Pressure altitude.....6,000 ft.
Landing weight.....3,000 lb.
Headwind.....15 kts.

1—506 ft.
2—619 ft.
3—1,125 ft.
4—1,744 ft.

2313. Determine the total landing distance required to land over a 50–foot obstacle. (See Figure 37.)

Ambient temperature.....60° F
Pressure altitude.....Sea level
Landing weight.....2,700 lb.
Headwind.....4 kts.

1—522 ft.
2—650 ft.
3—950 ft.
4—1,472 ft.

2314. Determine the total landing distance required to land over a 50–foot obstacle. (See Figure 37.)

Ambient temperature.....70° F
Pressure altitude.....4,000 ft.
Landing weight.....2,900 lb.
Headwind.....12 kts.

1—472 ft.
2—578 ft.
3—1,050 ft.
4—1,628 ft.

2315. Determine the total landing distance required to land over a 50–foot obstacle. (See Figure 37.)

Ambient temperature.....80° F
Pressure altitude.....5,000 ft.
Landing weight.....3,100 lb.
Headwind.....20 kts.

1—492 ft.
2—558 ft.
3—1,050 ft.
4—1,608 ft.

2316. Determine the total landing distance required to land over a 50–foot obstacle. (See Figure 37.)

Ambient temperature.....90° F
Pressure altitude.....3,000 ft.
Landing weight.....3,300 lb.
Headwind.....30 kts.

1—427 ft.
2—523 ft.
3—950 ft.
4—1,473 ft.

2317. Determine the approximate ground roll required after landing over a 50–foot obstacle. (See Figure 37.)

Ambient temperature.....95° F
Pressure altitude.....2,000 ft.
Landing weight.....3,400 lb.
Headwind.....Calm

1—585 ft.
2—715 ft.
3—1,300 ft.
4—2,015 ft.

2318. Determine the approximate ground roll required after landing over a 50–foot obstacle. (See Figure 37.)

Ambient temperature.....65° F
Pressure altitude.....2,000 ft.
Landing weight.....2,800 lb.
Headwind.....8 kts.

1—438 ft.
2—537 ft.
3—975 ft.
4—1,512 ft.

OBSTACLE LANDING

ASSOCIATED CONDITIONS:

POWER	AS REQUIRED TO MAINTAIN 800 FT/MIN DESCENT ON APPROACH
FLAPS	DOWN
GEAR	DOWN
RUNWAY	PAVED, LEVEL, DRY SURFACE
APPROACH SPEED	IAS AS TABULATED
BRAKING	MAXIMUM

NOTE: GROUND ROLL IS APPROX. 55% OF TOTAL LANDING DISTANCE OVER A 50 FT OBSTACLE.

EXAMPLE:

OAT	70° F.
PRESSURE ALTITUDE	2000 FT
LANDING WEIGHT	3000 LBS
HEAD WIND	10 KNOTS
TOTAL LANDING DISTANCE OVER A 50 FT OBSTACLE	1000 FT
GROUND ROLL (55% OF 1000)	550 FT
IAS APPROACH SPEED	76 MPH

WEIGHT POUNDS	IAS APPROACH SPEED (ASSUMES ZERO INSTR. ERROR)	
	MPH	KNOTS
3400	80	76
3200	78	68
3000	76	66
2800	73	63
2600	70	61
2400	67	58

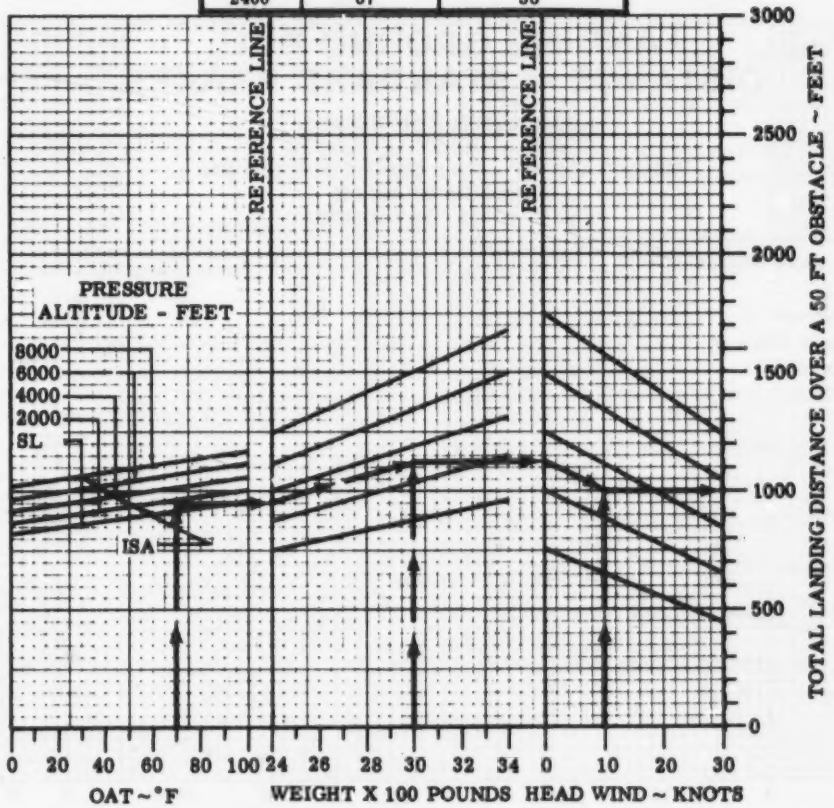


Figure 37

2319. What is the landing ground roll under the given conditions? (See Figure 38.)

Airport pressure altitude.....4,100 ft.
Airport temperature.....-10° C
Gross weight.....3,000 lb.
Headwind.....6 kts.

1—300 ft.
2—540 ft.
3—420 ft.
4—600 ft.

2320. What is the landing ground roll under the given conditions? (See Figure 38.

Airport pressure altitude.....4,150 ft.
Airport temperature.....30° C
Gross weight.....3,400 lb.
Headwind.....3 kts.

1—625 ft.
2—710 ft.
3—800 ft.
4—875 ft.

2321. Which is true concerning the effect of density altitude on aircraft performance.

1—As temperature increases, density altitude increases causing a decrease in aircraft performance.
2—An increase in density altitude will increase the aircraft's performance.
3—A decrease in density altitude will cause a decrease in aircraft performance.
4—The only effect high density altitude has on aircraft performance is a change in true airspeed.

2322. What would occur if the density altitude is 5,000 feet at an airport where the field elevation is 2,000 feet.?

1—Takeoff and landing performance would not be affected.
2—The altimeter would indicate 5,000 feet when the airplane is on the ground.
3—Takeoff and landing performance would be the same as an airport with an elevation of 5,000 feet.
4—The indicated takeoff and landing airspeed should be higher than on a standard day.

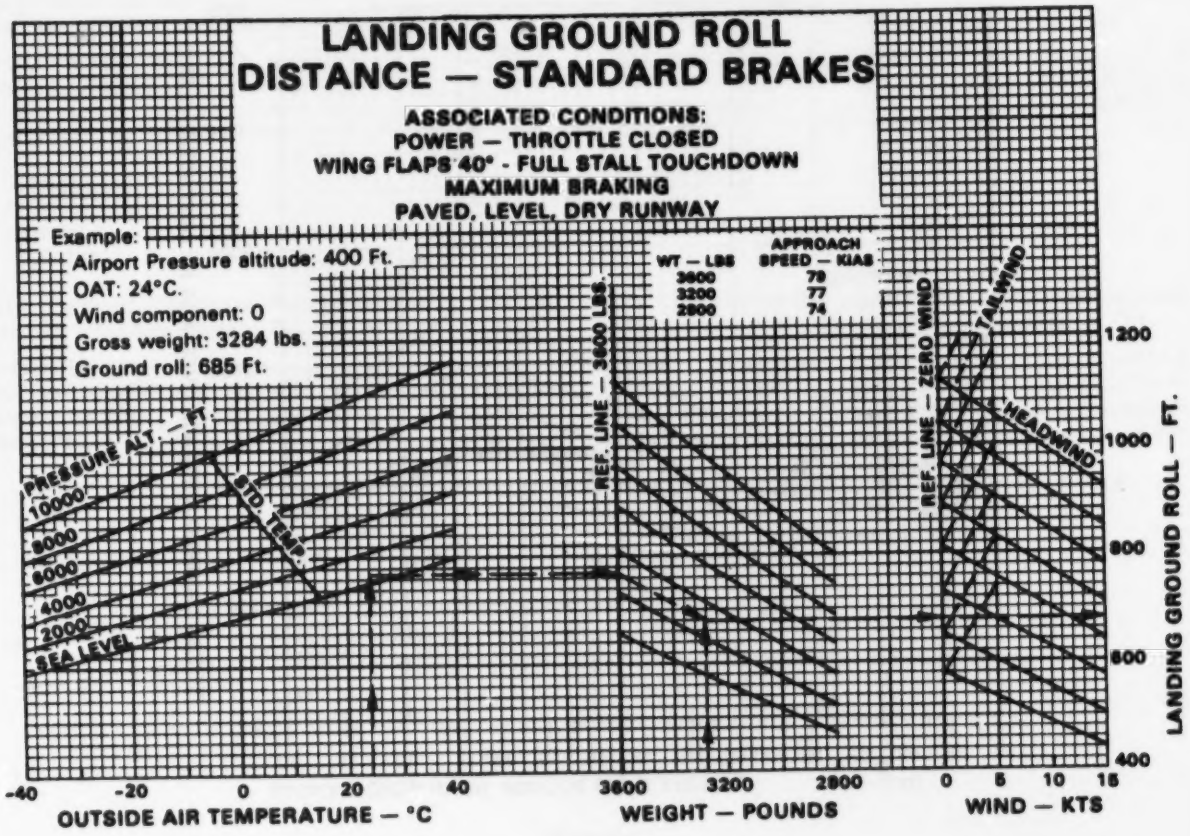


Figure 38

2323. Density altitude is used to determine

1—true altitude.
2—terrain clearance in mountainous areas.
3—performance capability of an aircraft.
4—absolute altitude.

2324. Which combination of atmospheric conditions will have the most adverse effect on airplane takeoff and climb performance?

1—Low temperature and high relative humidity.
2—High temperature and high relative humidity.
3—High temperature and low relative humidity.
4—Low temperature and low relative humidity.

2325. If atmospheric pressure and temperature remain constant, how would an increase in humidity affect total takeoff distance over a 50-foot obstacle?

1—Total distance would be shorter.
2—Total distance would not change; however, a greater percentage of the total distance would be required for the ground roll.
3—Total distance would be greater.
4—Ground roll distance would not change; however, distance from liftoff to 50 feet would increase.

2326. The most unfavorable combination of conditions for rotorcraft performance is

1—low density altitude, low gross weight, and calm wind.
2—low density altitude, high gross weight, and strong wind.
3—high density altitude, high gross weight, and calm wind.
4—high density altitude, high gross weight, and strong wind.

2327. How does high density altitude affect rotorcraft performance?

1—It increases rotor drag, which requires more power for normal flight.
2—It increases rotor efficiency, but decreases engine efficiency.
3—Engine and rotor efficiency is reduced.
4—Engine and rotor efficiency is increased.

2328. The primary reason for computing density altitude is to

1—determine pressure altitude.
2—ensure safe cruising altitude over mountainous terrain.
3—determine aircraft performance.
4—establish flight levels above 18,000 feet MSL.

2329. Which combination of atmospheric conditions will reduce aircraft takeoff and climb performance?

1—Low temperature, low relative humidity, and low density altitude.
2—High temperature, low relative humidity, and low density altitude.
3—High temperature, high relative humidity, and high density altitude.
4—Low temperature, high relative humidity, and high density altitude.

2330. Which statement is true regarding takeoff performance with high density altitude conditions?

1—The acceleration rate is slower because the engine and propeller efficiency is reduced.
2—The acceleration rate will increase since the lighter air creates less drag.
3—A shorter distance is required to accelerate to lift-off speed due to the reduced drag of lighter air.
4—A higher than normal indicated airspeed is required to produce sufficient lift since the air is less dense.

2331. How does high density altitude affect the takeoff performance of an airplane?

1—Increased drag will require more power for acceleration.
2—Reduced engine and propeller efficiency will decrease acceleration.
3—Reduced drag will increase the rate of acceleration.
4—A higher indicated airspeed is required to produce necessary lift.

2332. The performance tables of an aircraft for takeoff and climb are based on

1—pressure altitude.
2—density altitude.
3—true altitude.
4—density altitude corrected for temperature.

2333. Helicopter climb performance is most adversely affected by

1—higher than standard temperature and high relative humidity.
2—lower than standard temperature and high relative humidity.
3—higher than standard temperature and low relative humidity.
4—lower than standard temperature and low relative humidity.

2334. GIVEN:

Height above terrain.....12,000 ft.
Headwind.....20 kts.

What is the approximate glide distance? (See Figure 39.)

1—26 miles.
2—24 miles.
3—23 miles.
4—21 miles.

2335. GIVEN:

Height above terrain.....5,500 ft.
Tailwind.....10 kts.

What is the approximate glide distance? (See Figure 39.)

1—13 miles.
2—12 miles.
3—11 miles.
4—10 miles.

2336. GIVEN:

Height above terrain.....7,500 ft.
Headwind.....30 kts.

What is the approximate glide distance? (See Figure 39.)

1—16 miles.
2—13 miles.
3—11 miles.
4—9 miles.

GLIDE DISTANCE

ASSOCIATED CONDITIONS:

GEAR	UP
FLAPS	UP
COWL FLAPS	CLOSED
PROPELLER	FULL HIGH PITCH (LOW RPM)
GLIDE SPEED	122 MPH IAS

NOTES 1. INCREASE GLIDE DISTANCE APPROXIMATELY 10% FOR EACH 10 KNOTS OF TAIL WIND.
2. DECREASE GLIDE DISTANCE APPROXIMATELY 10% FOR EACH 10 KNOTS OF HEADWIND

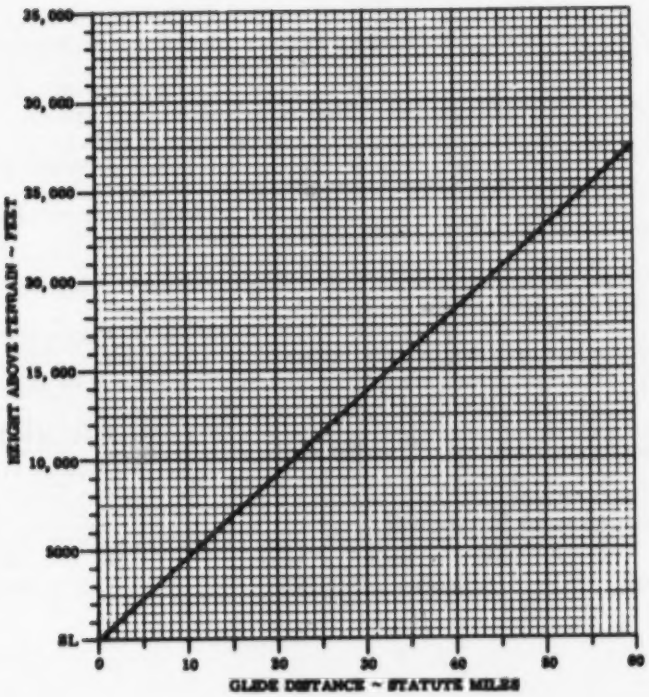


Figure 39

2337. An airplane descends to an airport under the following conditions:

Cruising altitude ..... 6,500 ft.
Airport elevation ..... 700 ft.
Descends to ..... 800 ft. AGL
Rate of descent ..... 500 ft./min.
Average true airspeed ..... 110 kts.
True course ..... 335°
Average wind velocity ..... 060° at 15 kts.
Variation ..... 3°W
Deviation ..... +2°
Average fuel consumption ..... 8.5 gal./hr.

Determine the approximate time, compass heading, distance, and fuel consumed during the descent.

1—12 min., 348°, 17 NM, 1.8 gal.
2—10 min., 348°, 18 NM, 1.4 gal.
3—10 min., 350°, 18 NM, 1.4 gal.
4—12 min., 346°, 18 NM, 1.6 gal.

2338. An airplane descends to an airport under the following conditions:

Cruising altitude ..... 7,500 ft.
Airport elevation ..... 1,300 ft.
Descends to ..... 800 ft. AGL
Rate of descent ..... 300 ft./min.
Average true airspeed ..... 120 kts.
True course ..... 165°
Average wind velocity ..... 240° at 20 kts.
Variation ..... 4°E
Deviation ..... –2°
Average fuel consumption ..... 9.6 gal./hr.

Determine the approximate time, compass heading, distance, and fuel consumed during the descent.

1—15 min., 168°, 32 NM, 2.6 gal.
2—16 min., 168°, 30 NM, 2.9 gal.
3—18 min., 164°, 34 NM, 3.2 gal.
4—18 min., 168°, 34 NM, 2.9 gal.

2339. An airplane descends to an airport under the following conditions:

Cruising altitude ..... 10,500 ft.
Airport elevation ..... 1,700 ft.
Descends to ..... 1,000 ft. AGL
Rate of descent ..... 600 ft./min.
Average true airspeed ..... 135 kts.
True course ..... 263°
Average wind velocity ..... 330° at 30 kts.
Variation ..... 7°E
Deviation ..... +3°
Average fuel consumption ..... 11.5 gal./hr.

Determine the approximate time, compass heading, distance, and fuel consumed during the descent.

1—13 min., 271°, 26 NM, 2.5 gal.
2—13 min., 271°, 24 NM, 2.8 gal.
3—10 min., 271°, 26 NM, 2.5 gal.
4—9 min., 274°, 26 NM, 2.8 gal.

2340. When refueling an aircraft, which precaution would be adequate for eliminating the potential hazard of static electricity?

1—Connect a ground wire between the aircraft, fuel truck, fuel nozzle, and ground.
2—Strain the fuel through a chamois.
3—Ensure that battery and ignition switches are turned off.
4—Connect a ground wire from the truck to the ground.

2341. If absolutely necessary to hand prop an engine, which is adequate to prevent the airplane from moving forward when the engine starts?

1—Have the passenger hold the brakes while operating the throttle.
2—Have a qualified person operate the controls and brakes, or chock the wheels and tie the tail down.
3—Set the throttle to the START position and lock the parking brake ON.
4—Head the airplane into the wind, then set the engine controls to a low power position.

2342. What pilot action should be taken when using fuel with a higher lead content than that recommended?

1—Avoid extremely lean mixture operation.
2—Avoid manifold pressures in excess of 25" Hg.
3—Operate the engine with an RPM that is lower than the manifold pressure.
4—Operate the engine with a leaner than normal mixture.

2343. The use of too low an octane fuel may cause

1—detonation.
2—higher manifold pressure.
3—a cooling effect on cylinders.
4—a prompt pre-ignition reaction.

2344. The amount of water absorbed in aviation fuels will

1—remain the same regardless of temperature changes.
2—decrease as the temperature of the fuel increases.
3—increase as the temperature of the fuel increases.
4—increase as the temperature of the fuel decreases.

2345. What is the main reason that fuel tank vents must be open?

1—To allow proper air pressure within the tanks for maintaining a steady fuel flow.
2—To allow fuel fumes to escape from the tanks, thus eliminating the possibility of the tanks exploding.
3—To allow excess fuel to drain overboard when heat expands the volume of fuel within the tanks.
4—To allow air to enter and prevent moisture from condensing and contaminating the fuel within the tanks.

2346. Refer to Figure 40.
GIVEN:

Airport pressure altitude ..... 2,000 ft.
Airport temperature ..... 10° C
Gross weight ..... 3,485 lb.
Headwind ..... 12 kts.

What would be the total landing distance required to clear a 50–foot obstacle under the given conditions?

1—1,630 ft.
2—1,215 ft.
3—1,420 ft.
4—1,540 ft.

2347. Refer to Figure 40.
GIVEN:

Airport pressure altitude ..... 1,000 ft.
Airport temperature ..... 22° C
Gross weight ..... 3,560 lb.
Headwind ..... 14 kts.

What would be the total landing distance required to clear a 50–foot obstacle under the given conditions?

1—1,500 ft.
2—1,610 ft.
3—1,800 ft.
4—1,825 ft.

2348. One advantage of fuel injection systems over carburetor systems is

1—less difficulty with hot weather vapor locks during ground operations.
2—better fuel distribution to the cylinders.
3—easier hot–engine starting.
4—easier in–flight restarting.

2349. One of the advantages of fuel injection systems over carburetor systems is

1—elimination of vapor locks during ground operations.
2—a reduction in the probability of evaporative icing.
3—easier restarting of an engine that quits because of fuel starvation.
4—less difficulty in starting a hot engine.

2350. Which operating procedure would most likely cause the cylinder head and oil temperature gauges to exceed the normal operating ranges?

1—Using fuel that has a rating lower–than–specified for the engine.
2—Using fuel that has a rating higher–than–specified for the engine.
3—Operating with higher–than–normal oil pressure.
4—Operating with the mixture control set too rich.

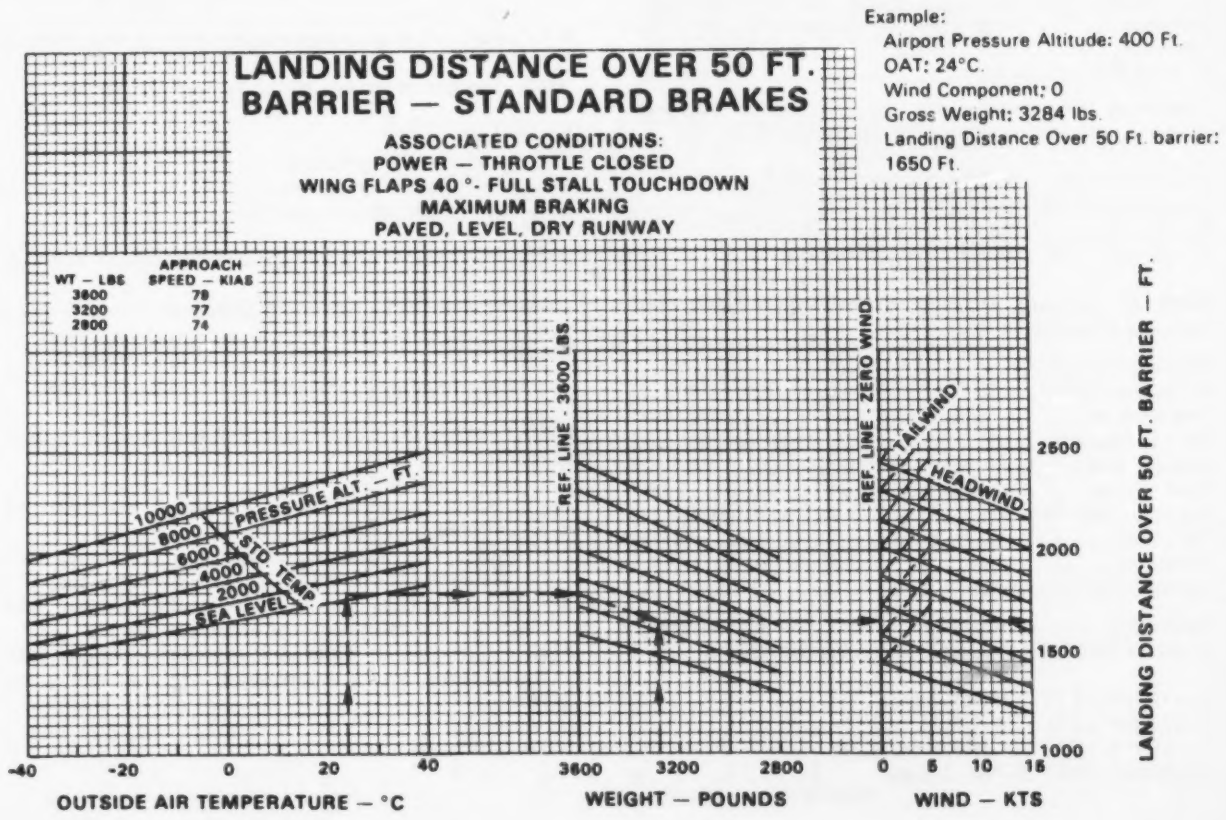


Figure 40

2351. One of the disadvantages of fuel injection systems compared with carburetor systems is

1—difficulty in starting a hot engine.
2—uneven fuel distribution to the cylinders.
3—slower throttle response.
4—poor control of fuel/air mixture.

2352. Which statement is true regarding the operation of a typical unsupercharged aircraft engine?

1—Operating with a excessively lean mixture for an extended period of time usually results in fouled spark plugs.
2—Most unsupercharged engines are capable of producing 100 percent rated power at or above 5,000 feet.
3—Detonation often cannot be recognized from the cockpit through sound or engine roughness.
4—In general, rich mixtures must be used with caution when operating at high-power settings.

2353. What energy source is used to drive the turbines of a turbocharged airplane?

1—Electrical system.
2—Ignition system.
3—Engine exhaust gases.
4—Engine compressor.

2354. During climb after takeoff in an airplane equipped with a constant-speed propeller, the power output of the engine should be reduced to climb power by decreasing manifold pressure and

1—increasing the RPM by increasing the propeller blade angle.
2—decreasing the RPM by increasing the propeller blade angle.
3—increasing the RPM by decreasing the propeller blade angle.
4—decreasing the RPM by decreasing the propeller blade angle.

2355. Prior to starting the engine the manifold pressure gauge usually indicates approximately 29" Hg. This is because the

1—pointer on the gauge is stuck at the full-power indication.
2—throttle is in the full-open position.
3—throttle is closed, trapping a high air pressure in the manifold.
4—pressure within the manifold is the same as atmospheric pressure.

2356. The power combination that is most likely to result in excessive cylinder pressure is a relatively

1—low manifold pressure with a high RPM.
2—high manifold pressure with a low RPM.
3—low manifold pressure with a low RPM.
4—high manifold pressure with a high RPM.

2357. During climbing flight using a turbocharged airplane, the manifold pressure will remain approximately constant until

1—an outside air temperature of –18° C is reached.
2—the waste gate is fully open and the turbine is operating at minimum speed.
3—the engine's critical altitude is reached.
4—an atmospheric pressure of 14.9" Hg is reached.

2358. The power combination that is least likely to result in excessive cylinder pressure is a relatively

1—low manifold pressure with a low RPM.
2—low manifold pressure with a high RPM.
3—high manifold pressure with a low RPM.
4—high manifold pressure with a high RPM.

2359. Which is true regarding propeller efficiency?

1—Propeller efficiency is not affected by propeller slippage.
2—Propeller efficiency is the ratio of thrust horsepower to brake horsepower.
3—Propeller efficiency is the theoretical distance a propeller should advance in one revolution.
4—Propeller efficiency is the actual distance a propeller advances in one revolution.

2360. A fixed-pitch propeller can be efficient only at a given combination of

1—airspeed and altitude.
2—airspeed and RPM.
3—air density and altitude.
4—altitude and RPM.

2361. The reason for variations in geometric pitch (twisting) along a propeller blade is that it

1—permits a relatively constant angle of incidence along its length when in cruising flight.
2—prevents the portion of the blade near the hub from stalling during cruising flight.
3—permits a relatively constant angle of attack along its length when in cruising flight.
4—prevents asymmetrical loading of the propeller during a climb.

2362. Which statement best describes the operating principle of a constant-speed propeller?

1—The selected pitch angle of the blades will remain constant regardless of changes in airplane attitude.
2—Pitch angle of the blades change through the use of governor-regulated oil pressure so that engine speed remains at the selected RPM.
3—As throttle setting is changed by the pilot, pitch angle of the propeller blades remains unchanged.
4—Propeller RPM always remains unchanged as engine speed increases and decreases.

2363. In airplanes equipped with constant–speed propellers, which procedure should be used to avoid placing undue stress on the engine components?

1—When power is being increased or decreased, the RPM should be adjusted before the manifold pressure.
2—When power is being decreased, reduce the RPM before reducing the manifold pressure.
3—When power is being increased, increase the RPM before increasing the manifold pressure.
4—When power is being increased, increase the manifold pressure before increasing the RPM.

2364. Air deflections produced by a rotating propeller cause dynamic pressure on the engine side of the propeller to be greater than atmospheric pressure, thus generating

1—torque.
2—horsepower.
3—drag.
4—thrust.

2365. A propeller rotating clockwise as seen from the rear, creates a spiraling slipstream that tends to rotate the airplane to the

1—right around the vertical axis, and to the right around the longitudinal axis.
2—right around the vertical axis, and to the left around the longitudinal axis.
3—left around the vertical axis, and to the right around the longitudinal axis.
4—left around the vertical axis, and to the left around the longitudinal axis.

2366. When back elevator pressure is applied in an airplane with a clockwise rotating propeller, as seen from the rear, gyroscopic action will cause a tendency for the airplane to

1—yaw to the right.
2—yaw to the left.
3—pitchup.
4—pitch down.

2367. A propeller rotating clockwise, as seen from the rear, creates a torque reaction during flight that gives the airplane a tendency to rotate to the

1—left around the lateral axis.
2—left around the longitudinal axis.
3—right around the vertical axis.
4—right around the longitudinal axis.

2368. Detonation may occur at high–power settings when

1—the intake valve opens before the previous charge of fuel has finished burning in the cylinder.
2—the fuel mixture is ignited too early by hot carbon deposits in the cylinder.
3—an excessively rich fuel mixture causes extremely slow burning of the fuel.
4—the fuel mixture explodes instead of burning progressively and evenly.

2369. If you suspect that the engine (with a fixed–pitch propeller) is detonating during climb–out after takeoff, the normal corrective action would be to

1—increase the rate of climb.
2—reduce the throttle.
3—lean the mixture.
4—apply carburetor heat.

2370. To obtain best efficiency on constant–speed propellers, which would be an appropriate setting for the given airspeeds?

1—A low–pitch setting (low RPM) when at slow airspeed.
2—A low–pitch setting (high RPM) when at cruise airspeed.
3—A high–pitch setting (low RPM) when at cruise airspeed.
4—A high–pitch setting (high RPM) when at slow airspeed.

2371. What effect does haze have on the ability to see traffic or terrain features during flight?

1—Haze causes the eyes to focus at infinity.
2—The eyes tend to overwork in haze and do not detect relative movement easily.
3—Contrasting colors become less distinct making objects more difficult to see.
4—All traffic or terrain features appear to be farther away than their actual distance.

2372. When the throttle is advanced during cruise on an aircraft that is equipped with a constant–speed propeller, the propeller pitch angle automatically

1—increases; the engine RPM remains the same.
2—increases; the engine RPM also increases.
3—decreases; the engine RPM remains the same.
4—decreases; the engine RPM increases.

2373. During cruising flight, when the throttle setting is decreased on an aircraft equipped with a constant–speed propeller, the propeller pitch automatically

1—increases and the RPM increases.
2—decreases and the RPM remains the same.
3—increases and the RPM remains the same.
4—decreases and the RPM decreases.

2374. How can you determine if another aircraft is on a collision course with your aircraft?

1—The other aircraft will be pointed directly at your aircraft.
2—The other aircraft will always appear to get larger and closer at a rapid rate.
3—The nose of each aircraft is pointed at the same point in space.
4—There will be no apparent relative motion between your aircraft and the other aircraft.

2375. Which statement concerning the operation of a vernier feature on the propeller control of a constant-speed propeller is correct?

1—Rotating the vernier knob clockwise will cause a large decrease in RPM.
2—Rotating the vernier knob counter-clockwise will cause a small increase in RPM.
3—Rotating the vernier knob clockwise will cause a small increase in RPM.
4—Rotating the vernier knob counter-clockwise will cause a large decrease in RPM.

2376. Concerning the advantages of an aircraft generator or alternator, select the true statement.

1—An alternator provides more electrical power at lower engine RPM than a generator.
2—A generator charges the battery during low engine RPM; therefore, the battery has less chance to become fully discharged, as often occurs with an alternator.
3—An alternator provides electrical current and eliminates the need for an aircraft to be equipped with a battery.
4—A generator always provides more electrical current than an alternator.

2377. In addition to the added safety factor, dual ignition systems also provide

1—shorter engine warmup periods.
2—improved engine performance.
3—better heat control of the engine.
4—easier starting.

2378. In addition to an added safety factor, dual ignition systems also provide

1—better combustion.
2—uniform engine heating.
3—shorter engine warmup periods.
4—less engine vibrations.

2379. For electrical energy, aircraft magnetos depend upon

1—batteries.
2—generators.
3—alternators.
4—self-contained magnets.

2380. When is vapor lock most likely to occur in an airplane's fuel system?

1—During cold, damp days.
2—During ground operations on hot days.
3—When the engine is operated at high-power settings.
4—When flying at very high density altitudes.

2381. When the pilot leans the mixture control, what is being accomplished?

1—The volume of air entering the carburetor is being reduced.
2—The amount of fuel entering the combustion chamber is being increased.
3—The volume of air entering the carburetor is being increased.
4—The amount of fuel entering the combustion chamber is being reduced.

2382. Which is true regarding fouling of the spark plugs of an aircraft engine?

1—Excessive heat in the combustion chamber of a cylinder causes oil to form on the center electrode of a spark plug fouling the plug.
2—Spark plug fouling results from operating with an excessively rich mixture.
3—Permitting the engine to idle for a long period of time on the ground is the best way to clear fouled spark plugs.
4—Carbon fouling of the spark plugs is caused primarily by operating an engine at excessively high cylinder head temperatures.

2383. The uncontrolled firing of the fuel/air charge in advance of normal spark ignition is known as

1—combustion.
2—pre-ignition.
3—atomizing.
4—detonation.

2384. The probable reason an engine continues to run after the ignition switch has been turned off is

1—faulty magneto timing.
2—burned out magneto breaker points.
3—a broken magneto ground wire.
4—a cracked intake manifold.

2385. If the ground wire between the magneto and the ignition switch becomes disconnected, the most noticeable result will be that the engine

1—will not operate on the left magneto.
2—cannot be started with the switch in the ON position.
3—cannot be shut down by turning the switch to the OFF position.
4—will not operate on the right magneto.

2386. A detuning of engine crankshaft counterweights is a source of overstress that may be caused by

1—carburetor ice forming on the throttle valve.
2—rapid opening and closing of the throttle.
3—operating with an excessively rich fuel/air mixture.
4—extended glides with reduced power.

2387. An abnormally high engine oil temperature indication may be caused by

1—the oil level being too low.
2—a defective bearing.
3—operating with an excessively rich mixture.
4—the oil level being too high.

2388. What effect, if any, would a change in ambient temperature or air density have on gas turbine engine performance?

1—As air density decreases, thrust increases.
2—As temperature increases, thrust increases.
3—No change occurs with either temperature or density altitude changes.
4—As temperature increases, thrust decreases.

2389. Frequent inspections should be made of aircraft exhaust manifold–type heating systems to minimize the possibility of

1—a power loss due to leaking exhaust connections.
2—a cold–running engine due to the heat withdrawn by the heater.
3—a power loss due to back pressure in the exhaust system.
4—exhaust gases leaking into the cockpit.

2390. For internal cooling, reciprocating aircraft engines are especially dependent on

1—a properly functioning thermostat.
2—air flowing over the exhaust manifold.
3—the circulation of lubricating oil.
4—a lean fuel/air mixture.

2391. In standard atmosphere at sea level, an engine developing full power produces a manifold pressure of 27″ Hg and 2600 RPM. What approximate MP and RPM should this engine produce in a standard atmosphere at 4,000 feet MSL under full power?

1—23″ Hg and 2600 RPM.
2—25″ Hg and 2600 RPM.
3—27″ Hg and 2200 RPM.
4—31″ Hg and 3000 RPM.

2392. Under standard atmospheric conditions at sea level, an engine using full power produces a manifold pressure of 29″ Hg and 2700 RPM. What manifold pressure and RPM should this engine be expected to produce at 3,000 feet MSL using full power under standard atmospheric conditions?

1—21″ Hg and 2400 RPM.
2—26″ Hg and 2700 RPM.
3—29″ Hg and 2400 RPM.
4—32″ Hg and 3000 RPM.

2393. Applying carburetor heat will

1—result in more air going through the carburetor.
2—not affect the mixture.
3—enrich the fuel/air mixture.
4—lean the fuel/air mixture.

2394. When operating a helicopter in conditions favorable for carburetor icing, the carburetor heat should be

1—OFF during takeoffs, approaches, and landings; adjusted to keep the carburetor air temperature gauge indicating in the green arc at all other times.
2—adjusted to keep the carburetor air temperature gauge indicating in the green arc at all times.
3—adjusted to keep the carburetor air temperature gauge in the yellow arc during hovering and takeoffs, and indicating in the green arc at all other times.
4—OFF for takeoffs, adjusted to keep the carburetor air temperature gauge indicating in the green arc at all other times.

2395. What will occur if no leaning is made with the mixture control as the flight altitude increases?

1—The volume of air entering the carburetor remains constant and the amount of fuel decreases.
2—The volume of air entering the carburetor decreases and the amount of fuel decreases.
3—The density of air entering the carburetor decreases and the amount of fuel remains constant.
4—The density of air entering the carburetor decreases and the amount of fuel increases.

2396. Unless adjusted, the fuel/air mixture becomes richer with an increase in altitude because the amount of fuel

1—remains constant while the weight of air decreases.
2—remains constant while the volume of air decreases.
3—increases while the volume of air decreases.
4—increases while the volume of air remains constant.

2397. The basic purpose of adjusting the fuel/air mixture control at altitude is to

1—decrease the amount of fuel in the mixture in order to compensate for increased air density.
2—decrease the fuel flow in order to compensate for decreased air density.
3—increase the amount of fuel in the mixture to compensate for the decrease in pressure and density of the air.
4—increase the fuel/air ratio for flying at altitude.

2398. At high altitudes, an excessively rich mixture will

1—increase the power available at that altitude.
2—cause the fouling of spark plugs.
3—cause the engine to operate smoother even though fuel consumption is increased.
4—cause the engine to overheat.

2399. The main purpose of the mixture control is to

1—adjust the fuel flow to obtain the proper air/fuel ratio.
2—decrease the air supplied to the engine.
3—increase the oxygen supplied to the engine.
4—decrease oxygen supplied to the engine.

2400. Fuel/air ratio is the ratio between the

1—volume of fuel and volume of air entering the cylinder.
2—volume of fuel and volume of air entering the carburetor.
3—weight of fuel and weight of air entering the cylinder.
4—weight of fuel and weight of air entering the carburetor.

2401. The best power mixture is that fuel/air ratio at which

1—the most power can be obtained for any given throttle setting.
2—climbs or descents can be made without adjusting the mixture control.
3—cylinder head temperatures are the coolest.
4—a given power can be obtained with the highest manifold pressure or throttle setting.

2402. The mixture control is used to reduce the amount of

1—airflow in both fuel injection and carburetor equipped engines.
2—airflow in carburetor equipped engines only.
3—fuel flow in both fuel injection and carburetor equipped engines.
4—fuel flow in fuel injection engines only.

2403. In comparison to fuel injection systems, float-type carburetor systems are generally considered to be

1—equally susceptible to icing as a fuel injection unit.
2—susceptible to icing only when visible moisture is present.
3—more susceptible to icing than a fuel injection unit.
4—less susceptible to icing than a fuel injection unit.

2404. An increase in carburetor air temperature while operating at the same altitude with the same RPM and manifold pressure, will produce

1—the same engine horsepower.
2—more engine horsepower.
3—less engine horsepower.
4—variable or fluctuating engine horsepower.

2405. Which statement is true concerning the effect of the application of carburetor heat?

1—It reduces the density of air entering the carburetor, thus enriching the fuel/air mixture.
2—It reduces the volume of air entering the carburetor, thus leaning the fuel/air mixture.
3—It reduces the density of air entering the carburetor, thus leaning the fuel/air mixture.
4—It reduces the volume of air entering the carburetor, thus enriching the fuel/air mixture.

2406. Detonation occurs in a reciprocating aircraft engine when

1—the spark plugs are fouled or shorted out or the wiring is defective.
2—hot spots in the combustion chamber ignite the fuel/air mixture in advance of normal ignition.
3—there is too rich a fuel/air mixture.
4—the unburned charge in the cylinders explodes instead of burning normally.

2407. Detonation in a reciprocating aircraft engine is most likely to occur when

1—the fuel/air mixture is of a ratio which causes extremely slow burning of the fuel within the cylinders.
2—the engine is operated at a temperature higher than design limits.
3—one spark plug breaks down under high pressure, causing uneven burning of the fuel/air mixture.
4—the fuel being used exceeds the recommended fuel grade.

2408. Detonation can be caused by

1—maintaining a sufficiently rich mixture.
2—using a higher grade fuel than recommended.
3—too lean a mixture.
4—low engine temperatures.

2409. In an aircraft equipped with a float-type carburetor and a constant-speed propeller, carburetor icing would probably first be detected by

1—a drop in engine RPM.
2—detonation.
3—a drop in manifold pressure and engine RPM.
4—a drop in manifold pressure.

2410. Which statement is true regarding induction system icing?

1—Induction system icing affects only engines equipped with carburetors.
2—Fuel ice is usually formed in the induction system of fuel injection engines.
3—Impact ice affects both fuel injection engines and engines equipped with carburetors.
4—Throttle ice is usually formed in the induction system of fuel injection engines.

2411. Which temperature range on a carburetor air temperature gauge is indicative of the range where carburetor icing is likely to occur in a float-type carburetor?

1— −15° C to +5° C.
2— 0° C to +15° C.
3— +15° C to +30° C.
4— −30° C to −15° C.

2412. In which sections of the carburetor would icing most likely occur?

1—Accelerator pump and main metering jet.
2—Float chamber and fuel inlet screen.
3—Venturi and the throttle valve.
4—Main air bleed and main discharge nozzle.

2413. The operating principle of float–type carburetors is based on the

1—automatic metering of air at the venturi as the aircraft gains altitude.
2—difference in air pressure at the venturi throat and the air inlet.
3—increase in air velocity in the throat of a venturi causing an increase in air pressure.
4—measurement of the fuel flow into the induction system.

2414. Which statement is true regarding airplane engine operation during cold weather?

1—Prolonged idling causes the spark plug electrodes to become saturated with congealed oil and results in shorting out the plugs.
2—Overpriming could result in poor compression and hard starting.
3—Engine parts expand, making it difficult to crank the engine.
4—Preheating an engine should be done only in an emergency.

2415. The first indication of carburetor icing in airplanes equipped with constant–speed propellers would most likely be a

1—rough running engine followed by an increase in manifold pressure.
2—decrease in manifold pressure.
3—decrease in RPM.
4—rough running engine followed by loss of RPM.

2416. In aircraft that are equipped with constant–speed propellers, carburetor icing would be first indicated by

1—a reduction in engine RPM.
2—a decrease in cylinder head temperature.
3—a reduction in manifold pressure.
4—engine roughness.

2417. In an airplane equipped with a constant–speed propeller and an MP (manifold pressure) gauge, the presence of carburetor ice can be verified by applying carburetor heat and noting an initial

1—decrease in MP and then a gradual increase in MP.
2—increase in MP and then a gradual decrease in MP.
3—increase in MP and then a gradual increase in MP.
4—decrease in MP with no further change in MP.

2418. The presence of carburetor ice, in an airplane equipped with a fixed–pitch propeller can be verified by applying carburetor heat and noting

1—an increase in RPM and then a gradual decrease in RPM.
2—a decrease in RPM and then a constant RPM indication.
3—an immediate increase in RPM with no further change in RPM.
4—a decrease in RPM and then a gradual increase in RPM.

2419. Which condition is most favorable to the development of carburetor icing?

1—Any temperature below freezing and a relative humidity of less than 50 percent.
2—Temperature between 32° F and 50° F and a relative humidity less than 50 percent.
3—Temperature between 0° F and 32° F and a relative humidity between 30 percent and 50 percent.
4—Temperature between 20° F and 70° F with visible moisture or high humidity.

2420. Concerning carburetor icing, which statement is true?

1—Carburetor icing would most likely form when the air temperature is between 20° F and 70° F with visible moisture or high humidity.
2—The carburetor heater is a deicing device that heats the air after it enters the carburetor.
3—The first indication of carburetor icing in an airplane equipped with a fixed–pitch propeller is an increase in RPM, followed by a decrease in RPM.
4—Carburetor icing will form in a carburetor whenever the temperature is below freezing (32° F 0° C).

2421. Which induction system ice prevention procedure is recommended before takeoff when carburetor icing may be anticipated?

1—Taxi with the carburetor heat on HOT; return to COLD for takeoff.
2—Briefly apply carburetor heat immediately before takeoff; return to COLD for takeoff.
3—Place the carburetor heat control halfway between HOT and COLD for takeoff.
4—Take off and climb with the carburetor heat in the HOT position.

2422. For gyroplanes with constant–speed propellers, the first indication of carburetor icing is usually

1—engine roughness followed by a decrease in engine RPM.
2—engine roughness followed by a decrease in manifold pressure.
3—a decrease in manifold pressure.
4—a decrease in engine RPM.

2423. In an engine equipped with a float–type carburetor, the low temperature that causes carburetor ice is normally the result of

1—vaporization of fuel and expansion of the air in the carburetor.
2—freezing temperature of the air entering the carburetor.
3—compression of air at the carburetor venturi.
4—low volatility of aviation fuel.

2424. A reciprocating engine in a helicopter is more likely to stop due to in–flight carburetor icing than the same type engine in an airplane. This statement

1—has no basis in fact. The same type engine will run equally well in either aircraft.
2—is true because a helicopter engine operates at or close to maximum RPM during flight.
3—is false. The clutch will immediately release the load from the helicopter engine under engine malfunctioning conditions.
4—is true. The freewheeling unit will not allow windmilling (flywheel) effect to be exerted on a helicopter engine.

2425. The purpose of the lead–lag (drag) hinge in a three–bladed, fully articulated helicopter rotor system is to compensate for

1—Coriolis effect.
2—lateral instability during autorotation.
3—geometric unbalance.
4—dissymmetry of lift.

2426. When computing weight and balance, the empty weight includes the weight of the airframe, engine(s), and all items of operating equipment permanently installed. Empty weight also includes

1—all usable fuel and oil, but does not include any radio equipment or instruments that were installed by someone other than the manufacturer.
2—all usable fuel, maximum oil, hydraulic fluid, but does not include the weight of pilot, passengers, or baggage.
3—the unusable fuel, hydraulic fluid, and undrainable oil or, in some aircraft, all of the oil.
4—all usable fuel and oil.

2427. The center of gravity of an airplane can be determined by which of the following methods?

1—Multiplying total arms by total weight.
2—Multiplying total weight by total moments.
3—Dividing total arms by total moments.
4—Dividing total moments by total weight.

2428. If all index units are positive when computing weight and balance the location of the datum would be at the

1—nose, or out in front of the airplane.
2—centerline of the nose or tailwheel depending on the type of airplane.
3—centerline of the main wheels.
4—trailing edge of the wings.

2429. GIVEN:

Total weight.....4,037 lb.
CG location.....Station 67.8
Fuel consumption.....14.7 GPH
Fuel CG.....Station 68.0

After 1 hour 45 minutes of flight time, the CG would be located at Station

1—67.79.
2—68.79.
3—69.78.
4—70.78.

2430. Your airplane is loaded to a gross weight of 5,000 pounds, with three pieces of luggage in the rear baggage compartment. The CG is 98″ aft of datum, which is 2″ aft of limits. If you move two pieces of luggage, which together weigh 100 pounds, from the rear baggage compartment (145″ aft of datum) to the front compartment (45″ aft of datum), what is the new CG?

1—95.8″ aft of datum.
2—96.0″ aft of datum.
3—96.5″ aft of datum.
4—97.0″ aft of datum.

2431. If the total airplane loaded weight is 8,900 pounds, approximately how far will the CG shift forward if a 200–pound passenger moves from a seat at F.S. 210 to a seat at F.S. 168?

1— 2.1 inches.
2— 1.4 inches.
3— .9 inch.
4— .4 inch.

2432. Refer to Figure 41. An airplane loaded with the CG at point A would require

1—greater total lift to maintain altitude and greater thrust to maintain the same airspeed as an airplane with the CG farther aft.
2—greater total lift to maintain altitude, but less thrust to maintain the same airspeed as an airplane with the CG farther aft.
3—less total lift to maintain altitude and less thrust to maintain the same airspeed as an airplane with the CG farther aft.
4—less total lift to maintain altitude, but greater thrust to maintain the same airspeed as an airplane with the CG farther aft.

2433. Refer to Figure 41. What effect would moving the CG from point A to point C have on the flight characteristics of the airplane?

1—The airplane would become less controllable at slow speeds, but more stable at any speed.
2—The airplane would become more controllable at slow speeds, but less stable at any speed.
3—The airplane would become more controllable at slow speeds and more stable at any speed.
4—The airplane would become less controllable at slow speed and less stable at any speed.

2434. Refer to Figure 41. Which statement is true regarding airplane CG location and cruising speed?

1—If loaded with the CG at point C, the airplane will cruise at a slower airspeed because of increased drag.
2—If loaded with the CG at point A, the airplane will cruise at a faster airspeed because of reduced drag.
3—If loaded with the CG at point C, the airplane will cruise at a faster airspeed because of reduced drag.
4—If loaded with the CG at point C, the airplane will cruise at a slower airspeed because of increased lift.

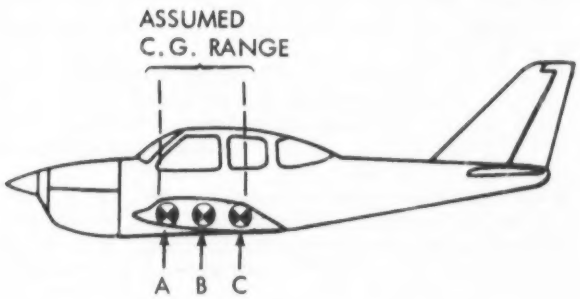


Figure 41

2435. Refer to Figure 41. An airplane loaded with the CG at point C would require

1—greater total lift to maintain altitude and greater thrust to maintain the same airspeed as an airplane with the CG farther forward.
2—greater total lift to maintain altitude, but less thrust to maintain the same airspeed as an airplane with CG farther forward.
3—less total lift to maintain altitude, and less thrust to maintain the same airspeed as an airplane with the CG farther forward.
4—less total lift to maintain altitude, but greater thrust to maintain the same airspeed as an airplane with the CG farther forward.

2436. Refer to Figure 41. Which statement is true regarding airplane CG location and stalling speed?

1—If loaded with the CG at point C, the airplane will stall at a higher airspeed because of increased wing loading.
2—If loaded with the CG at point C, the airplane will stall at a lower airspeed because of increased wing loading.
3—If loaded with the CG at point A, the airplane will stall at a higher airspeed because of increased wing loading.
4—If loaded with the CG at point A, the airplane will stall at a lower airspeed because of decreased wing loading.

2437. How does increased weight affect the takeoff distance of an airplane?

1—Every airplane has the same acceleration factor under the same atmospheric conditions, but a higher airspeed is needed to produce the additional lift required.
2—Every airplane has the same acceleration factor with the same power output, but a higher airspeed is needed to overcome the increased ground effect.
3—The airplane will accelerate more slowly with the same power output, and a higher airspeed is required to generate necessary lift for takeoff.
4—The airplane will accelerate more slowly with the same power output, but the same airspeed is required to generate necessary lift for takeoff.

2438. How will an increase in weight (loading) affect the performance of an airplane?

1—The lift/drag ratio will change.
2—The glide ratio will decrease.
3—The power setting required to produce a specific airspeed will change.
4—The indicated stalling speed will decrease.

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2439. Use Figure 42.
GIVEN:

Empty weight moment	91.6
Empty weight (oil included)	2270.0 lb.
Pilot and front seat passenger	340.0 lb.
Center passengers	300.0 lb.
Aft passengers	310.0 lb.
Baggage (aft of wheel well)	80.0 lb.
Fuel	60.0 gal.

If the airplane were loaded before takeoff as shown above, what would the total weight and moment be after 50.0 gal. of fuel have been used during flight?

1—Weight 3660.0; moment 170.9.
2—Weight 3660.0; moment 183.7.
3—Weight 3360.0; moment 170.9.
4—Weight 3360.0; moment 183.7.

2440. Use Figure 42.
GIVEN:

Empty weight moment	92.6
Empty weight (oil included)	2290.0 lb.
Pilot and front seat passenger	370.0 lb.
Center passengers	320.0 lb.
Aft passengers	150.0 lb.
Baggage (aft of wheel well)	100.0 lb.
Fuel	80.0 gal.

If the airplane were loaded before takeoff as shown above, what would the total weight and moment be after 40.0 gal. of fuel have been used during flight?

1—Weight 3470.0; moment 170.7.
2—Weight 3470.0; moment 168.6.
3—Weight 3710.0; moment 170.7.
4—Weight 3710.0; moment 168.6.

2441. Use Figure 42.
GIVEN:

Empty weight moment	93.6
Empty weight (oil included)	2310.0 lb.
Pilot and front seat passenger	400.0 lb.
Center passengers	340.0 lb.
Aft passengers	90.0 lb.
Baggage (aft of wheel well)	30.0 lb.
Fuel	70.0 gal.

If the airplane were loaded before takeoff as shown above, what would the total weight and moment be after 35.0 gal. of fuel have been used during flight?

1—Weight 3380.0; moment 164.1.
2—Weight 3380.0; moment 155.1.
3—Weight 3590.0; moment 164.1.
4—Weight 3590.0; moment 155.1.

2442. Use Figure 42.
GIVEN:

Empty weight moment	88.0
Empty weight (oil included)	2140.0 lb.
Pilot and front seat passenger	400.0 lb.
Center passengers	300.0 lb.
Aft passengers	310.0 lb.
Baggage (aft of wheel well)	100.0 lb.
Fuel	80.0 gal.

If the airplane were loaded before takeoff as shown above, what would the total weight and moment be after 50.0 gal. of fuel have been used during flight?

1—Weight 3730.0; moment 189.8.
2—Weight 3730.0; moment 177.0.
3—Weight 3430.0; moment 189.8.
4—Weight 3430.0; moment 177.0.

2443. Use Figure 42.
GIVEN:

Empty weight moment	98.2
Empty weight (oil included)	2306.0 lb.
Pilot and front seat passenger	340.0 lb.
Center passengers	340.0 lb.
Aft passengers	260.0 lb.
Baggage (aft of wheel well)	60.0 lb.
Fuel	75.0 gal.

If the airplane were loaded before takeoff as shown above, what would the total weight and moment be after 50.0 gal. of fuel have been used during flight?

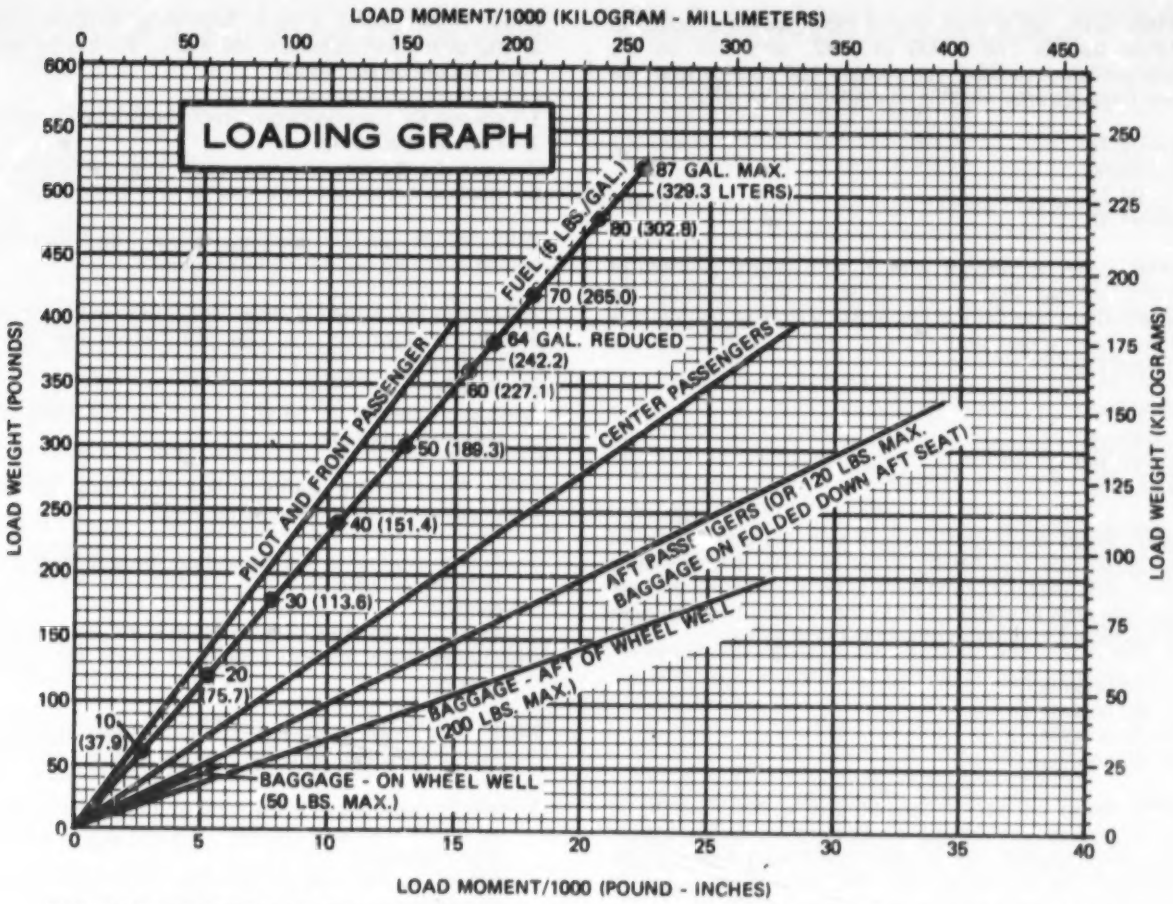
1—Weight 3456.0; moment 175.8.
2—Weight 3456.0; moment 188.6.
3—Weight 3756.0; moment 175.8.
4—Weight 3756.0; moment 188.6.

2444. Use Figure 42.
GIVEN:

Empty weight moment	99.7
Empty weight (oil included)	2288.0 lb.
Pilot and front seat passenger	330.0 lb.
Center passengers	250.0 lb.
Aft passengers	170.0 lb.
Baggage (aft of wheel well)	110.0 lb.
Fuel	70.0 gal.

If the airplane were loaded before takeoff as shown above, what would the total weight and moment be after 60.0 gal. of fuel have been used during flight?

1—Weight 3568.0; moment 180.1.
2—Weight 3568.0; moment 164.9.
3—Weight 3208.0; moment 180.1.
4—Weight 3208.0; moment 164.9.



NOTES: Lines representing adjustable seats show the pilot or passenger center of gravity on adjustable seats positioned for an average occupant.

Figure 42

2445. Given an aircraft with a ramp weight (loaded) of 3,600 pounds and a CG of 95.2, what will be the approximate new CG if you remove 100 pounds from the rear baggage area which is located at station 179?

1—91.78.
2—92.80.
3—94.13.
4—97.46.

2446. Given an aircraft with a ramp weight (loaded) of 3,575 pounds and a CG of 95.1, what will be the approximate new CG if a passenger weighing 150 pounds moves from a rear seat at station 157 to a center seat at station 118?

1—93.46.
2—92.39.
3—91.95.
4—92.01.

2447. Given an aircraft loaded with a ramp weight of 3,550 pounds and having a CG of 95.0, approximately how much baggage would have to be moved from the rear baggage area at station 179 to the forward baggage area at station 42 in order to move the CG to 92.0?

1—55 pounds.
2—62 pounds.
3—78 pounds.
4—85 pounds.

2448. Given an aircraft loaded with a ramp weight of 3,550 pounds and having a CG of 95.0, approximately how much baggage would have to be moved from the rear baggage area at station 179 to the forward baggage area at station 42 in order to move the CG to 92.5?

1—65 pounds.
2—75 pounds.
3—80 pounds.
4—95 pounds.

2449. Given an aircraft loaded with a ramp weight of 3,550 pounds and having a CG of 95.0, approximately how much baggage would have to be moved from the rear baggage area at station 179 to the forward baggage area at station 42 in order to move the CG to 91.0?

1—87.0 pounds.
2—92.8 pounds.
3—98.4 pounds.
4—103.6 pounds.

2450. Given an aircraft loaded on the ramp at a weight of 3,540 pounds with a CG at 87.0, what weight must be moved from the forward baggage area (station 42) to the rear baggage area (station 180) in order to move the CG aft 3 inches?

1—65 pounds.
2—77 pounds.
3—96 pounds.
4—138 pounds.

2451. While taxiing a light, high-wing airplane during strong quartering tailwinds, the aileron control (wheel or stick) should be positioned

1—toward the direction from which the wind is blowing.
2—neutral at all times.
3—opposite the direction from which the wind is blowing.
4—neutral, except when making turns into the wind.

2452. Which aileron positions should be used when taxiing in strong quartering headwinds?

1—Aileron up on the side from which the wind is blowing.
2—Aileron down on the side from which the wind is blowing.
3—Neutral.
4—Aileron parallel to the ground on the side from which the wind is blowing.

2453. When taxiing during strong quartering tailwinds, which aileron positions should be used?

1—Aileron parallel to the ground on the side from which the wind is blowing.
2—Neutral.
3—Aileron up on the side from which the wind is blowing.
4—Aileron down on the side from which the wind is blowing.

2454. With regard to the technique required for a crosswind correction on takeoff, a pilot should use

1—aileron pressure into the wind and initiate the lift-off at a normal airspeed in both tailwheel and nosewheel-type airplanes.
2—rudder as required to maintain directional control, aileron pressure into the wind, and higher than normal lift-off airspeed in both conventional and nosewheel type airplanes.
3—right rudder pressure, aileron pressure into the wind, and higher than normal lift-off airspeed in both tricycle and conventional gear airplanes.
4—normal takeoff technique with a nosewheel-type airplane, but use the technique described in response 2 when flying a tailwheel-type airplane.

2455. Which procedure would minimize the possibility of gear up landings?

1—Requesting the control tower to verify that the landing gear is down.
2—Committing prelanding procedures to memory.
3—Checking for a gear horn sound by closing the throttle while on final approach.
4—Completing a prelanding checklist.

2456. Which airspeed limitation is the maximum speed at which full or abrupt control movements may be used?

1—Never-exceed speed.
2—Maximum structural cruising speed.
3—Power-off stall speed.
4—Maneuvering speed.

2457. Maximum structural cruising speed is the maximum speed at which an airplane can be operated during

1—operations with gear extended.
2—abrupt maneuvers.
3—normal operations.
4—flight in smooth air.

2458. Why should flight speeds above V_{NE} be avoided?

1—Design limit load factors may be exceeded.
2—Control effectiveness is so impaired that the airplane becomes uncontrollable.
3—Excessive induced drag will result in structural failure.
4—The stalling speed is increased to where any maneuvering will result in a stall.

2459. Which is true regarding preheating an airplane during cold weather operations?

1—The cockpit as well as the engine should be preheated.
2—The possibility of fire is rare during preheating.
3—The cockpit area should not be preheated with portable heaters.
4—Hot air should be blown directly at the engine through the air intakes.

2460. During preflight in cold weather, crankcase breather lines should receive special attention because they are susceptible to being clogged by

1—moisture from the outside air which has frozen.
2—congealed oil from the crankcase.
3—ice from crankcase vapors that have condensed and subsequently frozen.
4—sediment in the crankcase.

2461. While cruising at 160 knots, you wish to establish a climb at 130 knots. When entering the climb (full panel), it is proper to make the initial pitch change by increasing back elevator pressure until the

1—airspeed indication reaches 130 knots.
2—vertical speed indication reaches the predetermined rate of climb.
3—attitude indicator, airspeed, and vertical speed indicate a climb.
4—attitude indicator shows the approximate pitch attitude appropriate for the 130-knot climb.

2462. While cruising at 190 knots, you wish to establish a climb at 160 knots. When entering the climb (full panel), it would be proper to make the initial pitch change by increasing back elevator pressure until the

1—airspeed indication reaches 160 knots.
2—vertical speed indication reaches the predetermined rate of climb.
3—attitude indicator, airspeed, and vertical speed indicate a climb.
4—attitude indicator shows the approximate pitch attitude appropriate for the 160-knot climb.

2463. To level off from a climb to a specific altitude, the pilot should lead the level-off by approximately

1—10 percent of the vertical speed.
2—25 percent of the vertical speed.
3—30 percent of the vertical speed.
4—50 percent of the vertical speed.

2464. In airplanes, a constant airspeed descent at cruising airspeed is properly entered from cruising flight by

1—simultaneously reducing power and adjusting the pitch on the attitude indicator to maintain the cruising airspeed.
2—first adjusting the pitch on the attitude indicator to establish a specific rate on the vertical speed indicator, then reducing power to re-establish cruising airspeed.
3—first reducing power, then adjusting the pitch on the attitude indicator to establish a specific rate on the vertical speed indicator.
4—first adjusting the pitch on the attitude indicator to the predetermined attitude for the descent, then adjusting the power to maintain the cruising airspeed.

2465. To level off at an airspeed higher than descending airspeed, assuming a 500 ft./min. rate of descent, the addition of power should be made at approximately

1—50 to 100 feet above the desired altitude.
2—100 to 150 feet above the desired altitude.
3—150 to 200 feet above the desired altitude.
4—200 to 250 feet above the desired altitude.

2466. A pilot's most immediate and vital concern in the event of complete power failure after becoming airborne on takeoff is

1—gaining altitude quickly.
2—turning back to the takeoff field.
3—landing directly into the wind.
4—maintaining a safe airspeed.

2467. Which type of approach and landing is recommended during gusty wind conditions?

1—A power-off approach and power-off landing.
2—A power-on approach and power-on landing.
3—A power-off approach and power-on landing.
4—A power-on approach and power-off landing.

2468. A proper crosswind landing on a runway requires that, at the moment of touchdown, the

1—direction of motion of the airplane and its lateral axis be perpendicular to the runway.
2—direction of motion of the airplane and its longitudinal axis be parallel to the runway.
3—upwind wheel should be braked lightly to control the shifting CG.
4—downwind wing lowered sufficiently to eliminate the tendency for the airplane to drift.

2469. To develop maximum power and thrust, a constant-speed propeller should be set to a blade angle which will produce a

1—large angle of attack and low RPM.
2—small angle of attack and high RPM.
3—large angle of attack and high RPM.
4—small angle of attack and low RPM.

2470. For takeoff, the blade angle of a controllable-pitch propeller should be set at an angle which produces

1—equal pressure on each side of each blade.
2—a small angle of attack.
3—a large angle of attack.
4—high drag forces on that propeller.

2471. To establish a climb after takeoff in an airplane equipped with a constant-speed propeller, the output of the engine is reduced to climb power by decreasing manifold pressure and

1—increasing RPM by decreasing propeller blade angle.
2—decreasing RPM by decreasing propeller blade angle.
3—increasing RPM by increasing propeller blade angle.
4—decreasing RPM by increasing propeller blade angle.

2472. When the throttle is advanced during cruise on an airplane that is equipped with a constant-speed propeller, the propeller pitch angle automatically

1—increases; the engine RPM remains the same.
2—increases; the engine RPM also increases.
3—decreases; the engine RPM remains the same.
4—decreases; the engine RPM increases.

2473. To avoid the wingtip vortices of a departing jet during takeoff, the pilot should

1—establish a flightpath downwind of the vortices.
2—lift off at a point well past the jet aircraft's flightpath.
3—climb above and stay upwind of the jet aircraft's flightpath.
4—remain below the flightpath of the jet aircraft.

2474. Which pilot action would be most appropriate for minimizing the hazards of wingtip vortices if cleared for takeoff behind a large jet?

1—Take off and climb at maximum speed to attain positive aircraft control in the event turbulence is encountered.
2—Taxi into position on the runway and hold until the vortices subside.
3—Maintain the ground run until past the point where the jet took off, and climb below the jet's flightpath.
4—Be airborne prior to reaching the point where the jet rotated, and climb above its flightpath.

2475. During a takeoff made behind a departing large jet airplane, the pilot can minimize the hazard of wingtip vortices by

1—being airborne prior to reaching the jet's flightpath until able to turn clear of its wake.
2—remaining below the jet's flightpath until able to turn clear of its wake.
3—maintaining extra speed on takeoff and climbout.
4—extending the takeoff roll and not rotating until well beyond the jet's rotation point.

2476. What effect would a light crosswind have on the wingtip vortices generated by a large airplane that had just taken off?

1—The upwind vortex would tend to remain on the runway longer than the downwind vortex.
2—A light crosswind would rapidly dissipate the strength of both vortices.
3—The downwind vortex would tend to remain on the runway longer than the upwind vortex.
4—Both vortices would move downwind at a greater rate than if the surface wind was directly down the landing runway.

2477. To avoid possible wake turbulence from a large jet aircraft that has just landed prior to your takeoff, at which point on the runway should you plan to become airborne?

1—Past the point where the jet touched down.
2—At the point where the jet touched down, or just prior to this point.
3—Approximately 500 feet prior to the point where the jet touched down.
4—At least 1,000 feet past the point where the jet touched down.

2478. Choose the correct statement regarding wake turbulence.

1—Vortices tend to remain level for a period of time.
2—Vortex generation begins with the initiation of the takeoff roll.
3—The primary hazard is loss of control because of induced roll.
4—The greatest vortex strength is produced when the generating airplane is heavy, clean, and fast.

2479. The principle cause of hazardous conditions associated with the wake turbulence of large airplanes is the

1—laminar flow airfoil used by airplane designs.
2—propeller or jetwash.
3—tornado-like vortices generated by the wingtips.
4—high speeds at which large airplanes operate.

2480. If wake turbulence is encountered, the probability of induced roll increases when the encountering aircraft's

1—heading is perpendicular to the flightpath of the generating aircraft.
2—heading is aligned with the flightpath of the generating aircraft.
3—altitude is higher than that of the generating aircraft.
4—airspeed is slower than that of the generating aircraft.

2481. Wingtip vortices created by large aircraft tend to

1—sink below the aircraft generating the turbulence.
2—rise into the traffic pattern.
3—rise into the takeoff or landing path of a crossing runway.
4—accumulate at the beginning of the takeoff roll.

2482. Which procedure should you follow to avoid wake turbulence if a large jet crosses your course from left to right approximately 1 mile ahead and at your altitude?

1—Slow your airspeed to V_A and maintain altitude and course.
2—Make sure you are slightly above the path of the jet.
3—Make sure you are slightly below the path of the jet and perpendicular to the course.
4—Descend 200 feet and turn 20° left; return to course and altitude after passing the path of the jet.

2483. When crossing the flightpath of a large jet airplane that is ahead and at the same altitude, to avoid wake turbulence, the pilot should

1—descend and adjust speed to maneuvering speed.
2—fly above the jet's flightpath.
3—descend below the jet's flightpath.
4—descend and fly parallel to the jet's flightpath.

2484. When turbulence is encountered during the approach to a landing, what action is recommended and for what primary reason?

1—Increase the airspeed slightly above normal approach speed to attain more positive control.
2—Increase the airspeed slightly above normal approach speed to penetrate the turbulence as quickly as possible.
3—Decrease the airspeed slightly below normal approach speed to prevent overshooting the landing area.
4—Decrease the airspeed slightly below normal approach speed to avoid overstressing the airplane.

2485. When landing behind a large jet aircraft, at which point on the runway should the touchdown be made?

1—At least 500 feet prior to the jet's touchdown point.
2—If there is any crosswind, land on the windward side of the runway and prior to the jet's touchdown point.
3—Beyond the jet's touchdown point.
4—At least 1,000 feet beyond the jet's touchdown point.

2486. When landing behind a large aircraft, which procedure should be followed for vortex avoidance?

1—Stay to one side of its final approach flightpath and land near the edge of the runway.
2—Stay above its final approach flightpath all the way to touchdown.
3—Stay well below its final approach flightpath and land at least 2,000 feet behind.
4—Stay below and to one side of its final approach flightpath.

2487. Which is true with respect to wake turbulence wingtip vortices?

1—Helicopters generate downwash turbulence only, not wingtip vortices.
2—The vortex strength is greatest when the generating aircraft is heavy, clean, and slow.
3—When vortices sink into ground effect, they tend to dissipate rapidly and offer little danger.
4—Wingtip vortices tend to remain level for a period of time before drifting below the generating aircraft's flightpath.

2488. With respect to wake turbulence wingtip vortices, which is true?

1—Helicopters generate downwash turbulence, not wingtip vortices.
2—The vortex strength is greatest when the generating aircraft is flying fast.
3—Wingtip vortices tend to remain level for a period of time before drifting below the generating aircraft's flightpath.
4—Wingtip vortices generated by helicopters trail behind the aircraft in the same manner as those generated by airplanes.

2489. Which is the best technique for minimizing the wing load factor when flying in severe turbulence?

1—Control altitude with power, airspeed with elevator, and accept variations of bank.
2—Control airspeed with power, maintain wings level, and accept variations of altitude.
3—Set power and trim to obtain an airspeed at or below maneuvering speed, maintain wings level, and accept variations of airspeed and altitude.
4—Control airspeed as closely as possible with elevator and power, and accept variation of bank and altitude.

2490. A pilot is entering an area where significant clear air turbulence has been reported. Which action is appropriate upon encountering the first ripple?

1—Extend flaps to decrease wing loading.
2—Extend gear to provide more drag and increase stability.
3—Enter a shallow climb or descent at maneuvering speed (V_{DA}).
4—Adjust airspeed to that recommended for rough air.

2491. If severe turbulence is encountered during flight, the pilot should reduce the airspeed to

1—design–maneuvering speed.
2—minimum control speed.
3—never–exceed speed.
4—maximum structural cruising speed.

2492. Which procedure should be used when penetrating turbulent air?

1—Set power for maneuvering speed and maintain constant airspeed with pitch control.
2—Set power for maneuvering speed and maintain a level flight attitude.
3—Reduce airspeed to maneuvering speed and maintain altitude with power control and airspeed with pitch control.
4—Reduce airspeed to maneuvering speed and maintain airspeed with power control and altitude with pitch control.

2493. Frost covering the upper surface of an airplane wing usually will cause

1—the airplane to stall at an angle of attack that is higher than normal.
2—drag factors so large that sufficient speed cannot be obtained for takeoff.
3—no problems for pilots of light aircraft.
4—the airplane to stall at an angle of attack that is lower than normal.

2494. If necessary to take off from a slushy runway, the freezing of landing gear mechanisms can be minimized by

1—retracting the gear immediately to prevent freezing.
2—delaying gear retraction.
3—increasing the airspeed to V_{LE} before retraction.
4—recycling the gear.

2495. Which is the correct sequence for recovery from a spiraling, nose–low, increasing airspeed, unusual flight attitude?

1—Increase pitch attitude, reduce power, and level wings.
2—Reduce power, correct the bank attitude, and raise the nose to a level attitude.
3—Reduce power, raise the nose to level attitude, and correct the bank attitude.
4—Correct the bank attitude, reduce power, and raise the nose until the altimeter has reversed direction of travel.

2496. Pilots are encouraged to turn on the aircraft rotating beacon

1—just prior to takeoff.
2—just prior to taxi.
3—anytime an engine is in operation.
4—only when the visibility is less than 5 miles.

2497. What is the general direction of movement of the other aircraft if during a night flight you observe a steady white light and a rotating red light ahead and at your altitude?

1—The other aircraft is crossing to your left.
2—The other aircraft is crossing to your right.
3—The other aircraft is approaching you head–on.
4—The other aircraft is headed away from you.

2498. What is the general direction of movement of the other aircraft during a night flight if you observe a steady red light and a rotating red light ahead and at your altitude?

1—The other aircraft is crossing to your left.
2—The other aircraft is crossing to your right.
3—The other aircraft is approaching you head–on.
4—The other aircraft is headed away from you.

2499. When in the vicinity of a VOR which is being used for navigation on VFR flights, it is important to

1—concentrate on the omni indicator and carefully make corrections so as to pass directly over the VOR.
2—exercise sustaining vigilance to avoid aircraft that may be converging on the VOR from other directions.
3—pass the VOR on the right side of the radial to allow room for aircraft flying in the opposite direction on the same radial.
4—attempt to locate the VOR visually to ensure that the VOR was actually passed when the TO/FROM indicator changed.

2500. A pilot flying a single–engine airplane observes a multiengine airplane approaching on a collision course from the left. Which pilot should give way and why?

1—The pilot of the multiengine airplane should give way; the single–engine airplane is to its right.
2—The pilot of the single–engine airplane should give way; the single–engine airplane is more maneuverable.
3—Each pilot should alter course to the right.
4—The pilot of the single–engine airplane should give way; the other airplane is to the left.

2501. If on a night flight the pilot of airplane A observes only the green wingtip light of airplane B, and the airplanes are converging, which airplane has the right–of– way?

1—Airplane B; it is to the right of airplane A.
2—Airplane A; it is to the right of airplane B.
3—Airplane B; it is to the left of airplane A.
4—Airplane A; it is to the left of airplane B.

2502. Two aircraft are approaching an airport for the purpose of landing. The right-of-way belongs to the aircraft

1—that is least maneuverable.
2—at the lower altitude, but the pilot shall not take advantage of this rule to cut in front of or to overtake the other aircraft.
3—that is either ahead of or to the other's right regardless of altitude.
4—that is to the left.

2503. Match the following maximum permissible indicated airspeeds for reciprocating engine aircraft to the airspace in which the speeds apply.

A. Airport traffic areas (located outside a terminal control area).
B. Airport traffic areas (located inside a terminal control area).
C. Beneath the lateral limits of a terminal control area.
D. Below 10,000 feet MSL.

a. 156 knots.
b. 180 knots.
c. 200 knots.
d. 250 knots.

The correct matching is

1—A–b; B–a; C–d; D–c.
2—A–a; B–d; C–c; D–d.
3—A–b; B–c; C–a; D–c.
4—A–d; B–a; C–a; D–d.

2504. While in flight a helicopter and an airplane are converging at a 90° angle, and the helicopter is located to the right of the airplane. Which aircraft has the right-of-way, and why?

1—The helicopter, because it is to the right of the airplane.
2—The helicopter, because helicopters have the right-of-way over airplanes.
3—The airplane, because airplanes have the right-of-way over helicopters.
4—The airplane, because it is to the left of the helicopter.

2505. The main rotor blades of a fully-articulated rotor system can

1—flap and feather collectively.
2—flap, drag, and feather independently.
3—feather independently, but cannot flap or drag.
4—flap and drag independently, but can feather collectively only.

2506. Cyclic control pressure is applied during flight that results in a maximum increase in main rotor blade pitch angle at point A. Which way will the rotor disc tilt?

1—Left.
2—Right.
3—Forward.
4—Aft.

2507. Cyclic control pressure is applied during flight that results in a maximum decrease in pitch angle of the rotor blades at position A. Which way will the rotor disc tilt?

1—Left.
2—Right.
3—Forward.
4—Aft.

2508. The proper action to initiate a quick stop is to

1—increase the RPM.
2—decrease the RPM.
3—apply aft cyclic.
4—raise the collective pitch.

2509. A medium-frequency vibration that suddenly occurs during flight could be indicative of a defective

1—freewheeling unit.
2—transmission system.
3—tail rotor system.
4—main rotor system.

2510. In most helicopters, medium-frequency vibrations indicate a defective

1—main rotor system.
2—tail rotor system.
3—engine.
4—transmission.

2511. Abnormal helicopter vibrations in the low-frequency range are associated with which system or component?

1—Engine.
2—Tail rotor.
3—Transmission.
4—Main rotor.

2512. Helicopter low-frequency vibrations are always associated with the

1—engine.
2—transmission.
3—tail rotor.
4—main rotor.

2513. A high-frequency vibration that suddenly occurs during flight could be an indication of a defective

1—freewheeling unit.
2—ignition system.
3—transmission.
4—main rotor system.

2514. Which is true regarding the proper use of controls during surface taxi?

1—The throttle should be used to control manifold pressure.
2—The antitorque pedals should be used to maintain ground track.
3—The collective pitch should be used to control taxi speed.
4—The cyclic should be used to maintain heading.

2515. To taxi on the surface in a safe efficient manner, one should use the cyclic pitch to

1—control taxi speed.
2—start and stop aircraft movement.
3—correct for drift during crosswind conditions.
4—maintain heading during crosswind conditions.

2516. During surface taxiing, the cyclic pitch stick is used to control

1—forward movement.
2—heading.
3—ground track.
4—rate of speed.

2517. During surface taxiing, the collective pitch is used to control

1—drift during a crosswind.
2—rate of speed.
3—ground track.
4—heading.

2518. To taxi on the surface in a safe and efficient manner, helicopter pilots should use the

1—collective pitch to control starting, taxi speed, and stopping.
2—antitorque pedals to correct for drift during crosswind conditions.
3—cyclic pitch to control starting, taxi speed, and stopping.
4—cyclic pitch to maintain heading during crosswind conditions.

2519. Departure on a flight from a high altitude heliport with a density altitude of 8,000 feet is planned. What would be the rate of climb in this helicopter during departure? (See Figure 43.)

1—808 ft./min.
2—825 ft./min.
3—913 ft./min.
4—1,000 ft./min.

2520. Departure from a heliport that has a reported density altitude of 8,500 feet is planned. What would be the rate of climb you can expect in this helicopter? (See Figure 43.)

1—800 ft./min.
2—900 ft./min.
3—950 ft./min.
4—1,050 ft./min.

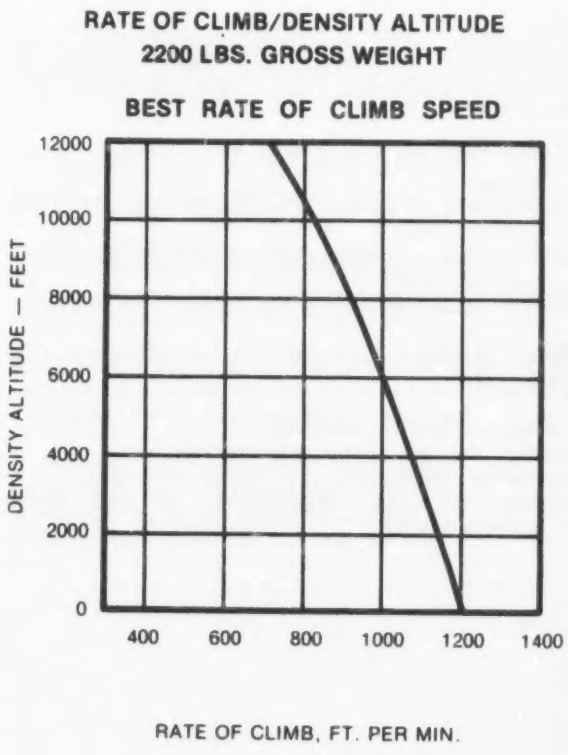


Figure 43

2521. Which would produce the slowest rotor RPM?

1—A takeoff.
2—A vertical descent with power.
3—A vertical descent without power.
4—Pushing over out of a steep climb.

2522. As altitude increases, the V_{NE} of a helicopter would

1—decrease up to critical altitude, then remain constant.
2—remain the same.
3—increase.
4—decrease.

2523. If power failure occurs at altitude, the pilot should immediately

1—center the pedals.
2—apply left pedal to correct for yaw.
3—lower the collective pitch control.
4—hold the collective pitch control in the neutral position.

2524. During the full flare portion of a power–off landing, the rotor RPM tends to

1—increase initially.
2—decrease initially.
3—remain constant.
4—decrease during high density altitude days, and increase during low density altitude days.

2525. When conducting a confined area–type operation, the primary purpose of the high reconnaissance is to determine

1—if the area will be large enough to permit a safe takeoff after landing.
2—the height of the obstructions surrounding the area.
3—the suitability of the area for landing.
4—the type of approach to be made.

2526. What type approach should be made to a rooftop heliport under conditions of relatively high wind and turbulence?

1—A normal approach.
2—A steeper–than–normal approach.
3—A shallower–than–normal approach.
4—A shallow approach, with higher–than–normal airspeed.

2527. During an approach to a rooftop heliport, if you suspect turbulence on final, plan to make a

1—shallow approach.
2—steep approach.
3—fast, shallow approach.
4—normal approach.

2528. If you expect to encounter turbulence and downdrafts during a pinnacle approach to a rooftop heliport, plan to make a

1—shallower–than–normal approach.
2—normal approach, maintaining a lower–than–normal airspeed.
3—shallow approach, maintaining a higher–than–normal airspeed.
4—steeper–than–normal approach.

2529. During a pinnacle approach to a rooftop heliport under conditions of high wind and turbulence, the pilot should make a

1—normal approach, maintaining a higher–than–normal airspeed.
2—shallow approach, maintaining a constant line of descent with cyclic applications.
3—normal approach, maintaining a slower–than–normal rate of descent with cyclic applications.
4—steeper–than–normal approach, maintaining the desired angle of descent with collective applications.

2530. What is the primary purpose of the clutch?

1—It provides disengagement of the engine from the rotor system for autorotation.
2—It transmits engine power to the main rotor, tail rotor, generator/alternator, and other accessories.
3—It provides speed reduction between the engine and the main rotor system.
4—It allows the engine to be started without driving the main rotor system.

2531. What is the primary purpose of the freewheeling unit?

1—It provides speed reduction between the engine, main rotor system, and tail rotor system.
2—It provides disengagement of the engine from the rotor system for autorotation purposes.
3—It allows the engine to be started without driving the main rotor system.
4—It transmits engine power to the main rotor, tail rotor, generator/alternator, and other accessories.

2532. The main rotor blades of a semirigid rotor system can

1—flap and feather as a unit.
2—feather independently, but cannot flap or drag.
3—flap, drag, and feather independently.
4—flap and drag independently, but can feather collectively only.

2533. Which is true concerning a running takeoff?

1—Normal climb speed should be attained between 10 to 20 feet.
2—If a helicopter cannot be lifted vertically, a running takeoff should be made.
3—One advantage of a running takeoff is that the additional airspeed can be converted quickly to altitude.
4—A running takeoff may be possible when gross weight or density altitude prevents a sustained hover at normal hovering altitude.

2534. Which flight technique is recommended for use during hot weather?

1—Use minimum allowable RPM and maximum allowable manifold pressure during all phases of flight.
2—During hovering flight, maintain minimum engine RPM during left pedal turns, and maximum engine RPM during right pedal turns.
3—During takeoff, accelerate quickly into forward flight.
4—During takeoff, accelerate slowly into forward flight.

2535. Which is true with respect to recovering from an accidental settling-with-power situation?

1—Since the inboard portions of the main rotor blades are stalled, cyclic control effectiveness will be reduced during the initial portion of the recovery.
2—Anti-torque pedals should not be utilized during the recovery.
3—Recovery can be accomplished by increasing rotor RPM, reducing forward airspeed, and minimizing maneuvering.
4—Recovery can be accomplished by reducing forward airspeed and increasing collective pitch.

2536. If anti-torque failure occurred during the landing touchdown, what could be done to help straighten out a left yaw prior to touchdown?

1—A flare to zero airspeed and a vertical descent to touchdown should be made.
2—Apply available throttle to help swing the nose to the right just prior to touchdown.
3—A normal running landing should be made.
4—Make a running landing using partial power and left cyclic.

2537. Which transponder requirement is correct for helicopter operations within a Group II TCA?

1—A transponder with 4096 code capability and automatic altitude reporting is required at all altitudes in the TCA.
2—A transponder with 4096 code capability is required only when operating above 2,500 feet AGL while in the TCA.
3—A transponder is not required for helicopter operations unless prevailing visibility is less than 1 mile in the TCA.
4—A transponder with 4096 code capability is required except when operating at or below 1,000 feet AGL under the terms of a letter of agreement.

2538. A helicopter is loaded in such a manner that the CG is located forward of the allowable CG limit. Which is true about this situation?

1—This condition would be more easily recognized when hovering in a strong headwind than when hovering in a calm wind.
2—This condition would become less hazardous as fuel is consumed if the fuel tank is located aft of the rotor mast.
3—Should the aircraft pitchup during cruise flight due to gusty winds, there may not be enough forward cyclic control available to lower the nose.
4—In case of engine failure and the resulting autorotation, sufficient cyclic control may not be available to flare properly to land.

2539. What is the procedure for a slope landing?

1—Use maximum RPM and maximum manifold pressure.
2—When parallel to the slope, slowly lower the downslope skid to the ground prior to lowering the upslope skid.
3—If the slope is 10° or less, the landing should be made perpendicular to the slope.
4—When parallel to the slope, slowly lower the upslope skid to the ground prior to lowering the downslope skid.

2540. Normal RPM should be maintained during a running landing primarily to ensure

1—that sufficient forward speed is available for the running landing.
2—longitudinal and lateral control, especially if the helicopter is heavily loaded or high density altitude conditions exist.
3—that sufficient lift is available should an emergency develop.
4—adequate directional control until the helicopter stops.

2541. A helicopter is loaded in such a manner that the CG is located aft of the aft allowable CG limit. Which is true about this hazardous situation?

1—If the helicopter should pitchup due to gusty winds during high-speed flight, there may not be sufficient forward cyclic control available to lower the nose.
2—This condition would become more hazardous as fuel is consumed, if the main fuel tank is located aft of the rotor mast.
3—In case of an autorotation, sufficient aft cyclic control may not be available to flare properly.
4—This out-of-balance situation would be easily recognized when hovering in a strong headwind.

2542. During a normal approach to a hover, the cyclic pitch is used primarily to

1—control rate of closure.
2—maintain heading.
3—control angle of descent.
4—prevent loss of translational lift.

2543. A pilot is hovering during calm wind conditions. The greatest amount of engine power will be required when

1—making a left-pedal turn.
2—making a right-pedal turn.
3—ground effect exist.
4—holding a fixed heading.

2544. During calm wind conditions, which of these flight operations would require the most power?

1—A running takeoff.
2—A right-pedal turn.
3—A left-pedal turn.
4—Hovering in ground effect.

2545. You are hovering during calm wind conditions and decide to make a right-pedal turn. In this situation, the engine RPM will

1—increase.
2—remain unaffected.
3—become erratic.
4—decrease.

2546. The most power will be required to hover over which surface? (Assume like atmospheric condition.)

1—Concrete ramp.
2—Rough/uneven ground.
3—Smooth water.
4—High grass.

2547. What are the major indications of an incipient retreating blade stall situation, in order of occurrence?

1—Slow pitchup of the nose, high-frequency vibration, and a tendency for the helicopter to roll.
2—Low-frequency vibration, pitchup of the nose, and a tendency for the helicopter to roll.
3—Slow pitchup of the nose, tendency for the helicopter to roll, followed by a medium-frequency vibration.
4—High-frequency vibration, pitch down of the nose, and a tendency for the helicopter to roll.

2548. What are the major warnings of an approaching retreating blade stall condition, in order of occurrence?

1—Low-frequency vibration, pitchup of the nose, and a tendency for the helicopter to roll.
2—Medium-frequency vibration, pitch down of the nose, and a tendency for the helicopter to roll.
3—Slow pitchup of the nose, tendency for the helicopter to roll, followed by a medium-frequency vibration.
4—High-frequency vibration, pitch down of the nose, and a tendency for the helicopter to roll.

2549. When operating at high forward airspeed, retreating blade stall is more likely to occur under conditions of

1—low gross weight, low density altitude, and turbulent air.
2—low gross weight, high density altitude, and smooth air.
3—high gross weight, low density altitude, and smooth air.
4—high gross weight, high density altitude, and turbulent air.

2550. How should a pilot react at the onset of retreating blade stall?

1—Reduce collective pitch, rotor RPM, and forward airspeed.
2—Reduce collective pitch, increase rotor RPM, and reduce forward airspeed.
3—Increase collective pitch, reduce rotor RPM, and reduce forward airspeed.
4—Increase collective pitch, rotor RPM, and forward airspeed.

2551. Which procedure will result in recovery from settling-with-power with the least loss of altitude?

1—Maintain constant collective pitch and increase throttle.
2—Increase forward speed and partially lower collective pitch.
3—Increase collective pitch and power.
4—Reduce collective pitch to the minimum and increase throttle.

2552. The addition of power in a settling-with-power situation produces an

1—effective recovery.
2—increase in airspeed.
3—even greater rate of descent.
4—increase in cyclic control effectiveness.

2553. Under which situation is accidental settling-with-power likely to occur?

1—A shallow approach in which the airspeed is permitted to drop below 10 MPH.
2—Hovering in ground effect during calm wind, high-density altitude conditions.
3—A steep approach in which the airspeed is permitted to drop to nearly zero.
4—An autorotative descent in which the airspeed is permitted to drop below 20 MPH.

2554. During a near-vertical power approach into a confined area with the airspeed near zero, what hazardous condition may develop?

1—Ground resonance when ground contact is made.
2—A settling-with-power condition.
3—Blade stall vibration could develop.
4—Coning could develop due to high blade loading.

2555. Operating within the high-speed shaded area of a height-velocity diagram should be avoided because, if an engine failure should occur,

1—a flare would cause too great a gain in altitude.
2—high forward speed would result in an excessively rapid decay of rotor speed.
3—a safe landing may not be possible.
4—a flare would not be possible.

2556. An excessively steep approach angle and abnormally slow closure rate should be avoided during an approach to a hover, primarily because

1—high cyclinder head and engine oil temperatures may occur.
2—the airspeed indicator would be unreliable.
3—a go-around would be very difficult to accomplish.
4—a settling-with-power situation could develop, particularly during the termination.

2557. During a normal approach to a hover, the collective pitch control is used primarily to

1—maintain RPM.
2—control the rate of closure.
3—control the angle of descent.
4—prevent loss of translational lift.

2558. What is meant by the term translating tendency?

1—The tendency of the rotor blade to produce a region of low pressure ahead of and in the sphere of blade rotation.
2—The increase in rotor efficiency as airspeed reaches approximately 15 MPH.
3—The tendency of the entire helicopter to move in the direction of tail rotor thrust.
4—The tendency of the rotor blade to increase or decrease is rotational velocity.

2559. Should a helicopter pilot ever be concerned about ground resonance during takeoff?

1—No; ground resonance occurs only during an autorotative touchdown.
2—Yes; although it is more likely to occur on landing, it can occur during takeoff.
3—Yes, but only during slope takeoffs.
4—No, this hazardous phenomena can occur only during landing.

2560. Ground resonance is more likely to occur with helicopters that are equipped with

1—semi-rigid rotor systems.
2—fully articulated rotor systems.
3—landing skids.
4—rigid rotor systems.

2561. The primary purpose of the tail rotor system is to

1—assist in making coordinated turns.
2—maintain heading during forward flight.
3—counteract the torque effect of the main rotor.
4—provide additional thrust and lift.

2562. Can the tail rotor produce thrust to the left?

1—No.
2—Yes; primarily to counteract the drag of the transmission during autorotation.
3—Yes; primarily so the pilot can maintain heading with a crosswind from the left.
4—Yes; primarily so that hovering turns can be accomplished to the right.

2563. When hovering, a helicopter tends to move in the direction of tail rotor thrust. This statement is

1—false; the movement is opposite the direction of tail rotor thrust, and is called transverse flow effect.
2—false; the movement is opposite the direction of tail rotor thrust, and is called Coriolis effect.
3—true; the movement is called translating tendency.
4—true; the movement is called translational lift.

2564. The forward speed of a rotorcraft is restricted primarily by

1—air density.
2—high-frequency vibrations.
3—dissymmetry of lift.
4—transverse flow effect.

2565. A helicopter tends to drift to the right when hovering. This statement is

1—false; helicopters show no tendency to drift a specific direction.
2—false; helicopters tend to drift to the left when hovering.
3—true; the pilot applies collective pitch to overcome this tendency.
4—true; the mast or cyclic pitch system of most helicopters is rigged to the left to overcome this tendency.

2566. Coning is caused by the combined forces of

1—lift and centrifugal force.
2—drag, weight, and gravity.
3—weight and centrifugal force.
4—gravity and thrust.

2567. When a rotorcraft transitions from straight-and-level flight into a 30° bank while maintaining a constant altitude, the total lift force must

1—remain constant and the load factor will increase.
2—remain constant and the load factor will decrease.
3—increase and the load factor will decrease.
4—increase and the load factor will increase.

2568. The unequal lift across the rotor disc that occurs in horizontal flight as a result of the difference in velocity of the air over the advancing half of the disc area and the air passing over the retreating half of the disc area is known as

1—dissymmetry of lift.
2—coning.
3—disc loading.
4—blade flapping.

2569. The lift differential that exists between the advancing blade and the retreating blade is known as

1—Coriolis effect.
2—translational lift.
3—translating tendency.
4—dissymmetry of lift.

2570. Determine the hovering ceiling under the following conditions: (See Figure 44.)

Helicopter gross weight
(with muffler)..... 1,600 lb.
Ambient temperature.....85° F

1—2,700 ft.
2—3,200 ft.
3—3,700 ft.
4—4,100 ft.

2571. Determine the hovering ceiling under the following conditions: (See Figure 44.)

Helicopter gross weight
(no muffler).....1,450 lb.
Ambient temperature.....65° F

1—6,750 ft.
2—7,250 ft.
3—8,450 ft.
4—8,850 ft.

2572. Determine the hovering ceiling under the following conditions: (See Figure 44.)

Helicopter gross weight
(with muffler)..... 1,550 lb.
Ambient temperature.....75° F

1—3,600 ft.
2—4,400 ft.
3—5,100 ft.
4—6,200 ft.

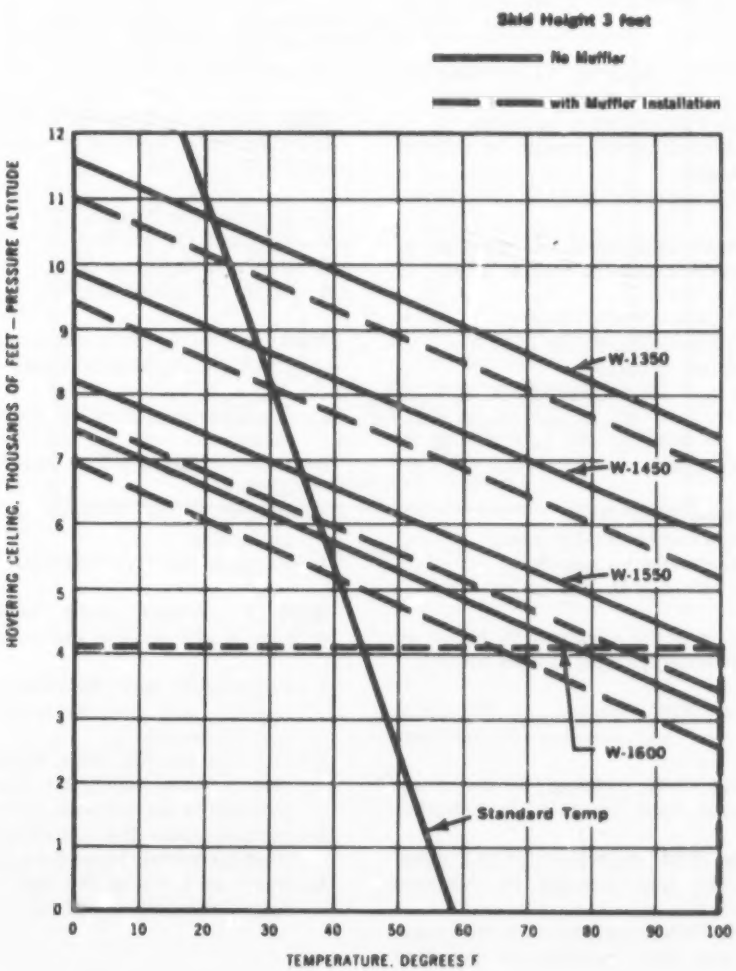


Figure 44

2573. Select the true statement about autorotational landings.

1—The touchdown should be made with a slightly nose-high attitude with respect to the surface.
2—Some aft cyclic application after touchdown is desirable to help decrease the ground run.
3—The touchdown should be made with the skids in a level attitude (longitudinal) with respect to the surface.
4—The anti-torque pedals should remain in the neutral position after ground contact is made.

2574. Which statement is true about an autorotative descent?

1—The rotor RPM will tend to decrease if a tight turn is made with a heavily loaded helicopter.
2—The pilot should use the collective pitch control to control the rate of descent.
3—Generally, only the cyclic control is used to make turns.
4—Rate of descent will be lowest at zero airspeed.

2575. Which should be observed during an autorotative descent?

1—The rotor RPM will have a tendency to decrease if a tight turn is made with a heavily loaded helicopter.
2—A zero airspeed descent should never be made.
3—The collective pitch control should always be used to control the rate of descent.
4—Normally only the cyclic control is used to make turns.

2576. During an autorotative descent, using left pedal to assist a left turn will probably cause the rotor RPM to

1—decrease; the aircraft nose will pitch down.
2—decrease; the aircraft nose will pitch up.
3—increase; the airspeed will decrease.
4—increase; the aircraft nose will pitch down.

2577. Using left pedal to assist a left turn during an autorotative descent will probably cause the rotor RPM to

1—increase and the airspeed to decrease.
2—decrease and the aircraft nose to pitch down.
3—increase and the aircraft nose to pitch down.
4—decrease and the aircraft nose to pitch up.

2578. Using right pedal to assist a right turn during an autorotative descent will probably result in what actions?

1—A decrease in rotor RPM, pitchup of the nose, decrease in sink rate, and increase in indicated airspeed.
2—An increase in rotor RPM, pitchup of the nose, decrease in sink rate, and increase in indicated airspeed.
3—A decrease in rotor RPM, pitchdown of the nose, increase in sink rate, and increase in indicated airspeed.
4—An increase in rotor RPM, pitchdown of the nose, increase in sink rate, and decrease in indicated airspeed.

2579. When executing an autorotation to touchdown, what action is most appropriate?

1—The anti-torque pedals should remain neutral after ground contact.
2—Aft cyclic application after touchdown is desirable to help decrease ground run.
3—A slightly nose-high attitude at touchdown is the proper procedure.
4—The skids should be in a longitudinally level attitude at touchdown.

2580. During level flight, if the manifold pressure is high and the RPM is low, what initial corrective action should be made?

1—Decrease the throttle.
2—Increase the throttle.
3—Lower the collective pitch.
4—Raise the collective pitch.

2581. If the RPM is low and the manifold pressure is high, what initial corrective action should be taken?

1—Increase the throttle.
2—Lower the collective pitch.
3—Raise the collective pitch.
4—Decrease the throttle.

2582. During climbing flight, the manifold pressure is low and the RPM is high. What initial corrective action should be taken?

1—Increase the throttle.
2—Decrease the throttle.
3—Raise the collective pitch.
4—Lower the collective pitch.

2583. During the entry into a quick stop, how should the collective pitch control be used?

1—It should be raised as necessary to prevent a rotor overspeed.
2—It should be raised as necessary to prevent a loss of altitude.
3—It should be lowered as necessary to prevent ballooning.
4—It should remain in the NEUTRAL position.

2584. If complete power failure should occur while cruising at altitude, the pilot should

1—immediately lower the collective pitch to the full-down position and simultaneously apply right pedal to correct for yaw.
2—close the throttle, lower the collective pitch to the full-down position, apply left pedal to correct for yaw, and establish a normal power-off glide.
3—partially lower the collective pitch, close the throttle, then completely lower the collective pitch.
4—make all turns to the right to ensure that adequate rotor RPM will be available.

2585. Which airspeed/altitude combinations should be avoided during helicopter operations? (See Figure 45.)

1—50 MPH/50 feet AGL.
2—30 MPH/200 feet AGL.
3—50 MPH/300 feet AGL.
4—60 MPH/20 feet AGL.

2586. Which airspeed/altitude combinations should be avoided during helicopter operations? (See Figure 45.)

1—20 MPH/200 feet AGL.
2—35 MPH/175 feet AGL.
3—40 MPH/75 feet AGL.
4—60 MPH/60 feet AGL.

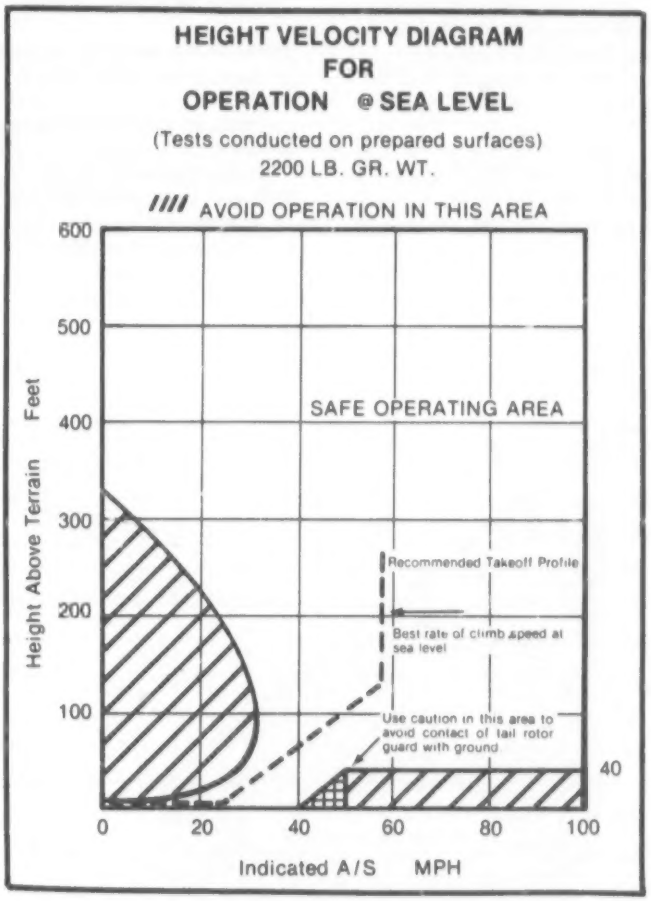


Figure 45

2587. The anti-torque system fails during cruising flight and a powered approach landing is commenced. If the helicopter yaws to the right just prior to touchdown, what could the pilot do to help swing the nose to the left?

1—Decrease airspeed.
2—Increase collective pitch.
3—Increase the throttle.
4—Decrease the throttle.

2588. Which airspeed/altitude combination should be avoided during helicopter operations? (See Figure 46.)

1—25 MPH/400 feet AGL.
2—35 MPH/15 feet AGL.
3—45 MPH/15 feet AGL.
4—55 MPH/100 feet AGL.

2589. Which airspeed/altitude combination should be avoided? (See Figure 46.)

1—35 MPH/350 feet.
2—50 MPH/300 feet.
3—70 MPH/25 feet.
4—30 MPH/10 feet.

2590. Takeoff from a slope is normally accomplished by

1—simultaneously applying collective pitch and downslope cyclic control.
2—bringing the helicopter to a level attitude before completely leaving the ground.
3—making a downslope running takeoff if the surface is smooth.
4—rapidly increasing collective pitch and upslope cyclic controls to avoid sliding downslope.

2591. When planning slope operations, only slopes of 5° gradient or less should be considered, primarily because

1—ground effect is lost on slopes of steeper gradient.
2—upslope ground contact could be made by the main rotor blades on slopes of steeper gradient.
3—most helicopters are not designed for operations on slopes of steeper gradient.
4—downwash turbulence is more severe on slopes of steeper gradient.

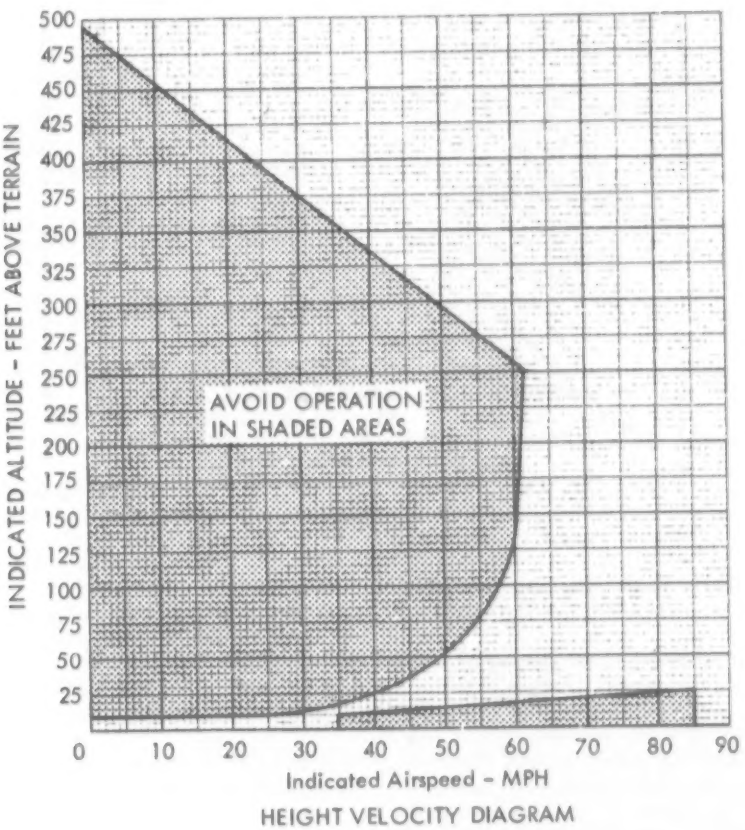


Figure 46

2592. When making a slope landing, the cyclic pitch control should be used to

1—place the rotor disc parallel to the slope.
2—hold the upslope skid against the slope.
3—lower the downslope skid to the ground.
4—maintain heading throughout the maneuver.

2593. Why should gyroplane operations within the cross-hatched portion of a Height vs. Velocity Chart be avoided?

1—The rotor RPM may decay before ground contact is made if an engine failure should occur.
2—Turbulence near the surface can dephase the blade dampers causing geometric unbalanced conditions on the rotor system.
3—Sufficient airspeed may not be available to ensure a safe landing in case of an engine failure.
4—The rotor RPM may build excessively high if it is necessary to flare at such low altitudes.

2594. The principal reason the shaded area of a Height vs. Velocity Chart should be avoided is

1—turbulence near the surface can dephase the blade dampers.
2—rotor RPM may decay before ground contact is made if an engine failure should occur.
3—rotor RPM may build excessively high if it is necessary to flare at such low altitudes.
4—insufficient airspeed would be available to ensure a safe landing in case of an engine failure.

2595. The principal factor limiting the never-exceed speed (V_{NE}) of a gyroplane is

1—turbulence and altitude.
2—retreating blade stall only.
3—blade-tip speed, which must remain below the speed of sound.
4—lack of sufficient cyclic stick control to compensate for dissymmetry of lift or retreating blade stall, depending on which occurs first.

2596. Select the true statement concerning gyroplane taxi procedures.

1—The cyclic stick should be held in the neutral position at all times.
2—Avoid abrupt control movements when blades are turning.
3—The cyclic stick should be held slightly aft of neutral at all times.
4—Taxi on rough terrain at a slightly higher speed when the rotor blades are turning.

2597. If ground resonance is experienced during rotor spin-up, what action should you take?

1—Taxi to a smooth area.
2—Close the throttle and slowly raise the spin-up lever.
3—Make a normal takeoff immediately.
4—Make a jump takeoff immediately.

2598. During the transition from pre-rotation to flight, all rotor blades change pitch

1—simultaneously to the same angle of incidence.
2—simultaneously but to different angles of incidence.
3—to the same degree at the same point in the cycle of rotation.
4—only as effective translational lift is attained.

2599. GIVEN:

Pressure altitude.....4,000 ft.
Ambient temperature.....80° F

To clear a 50–foot obstacle, a jump takeoff would require (see Figures 47 and 48)

1—more distance than a running takeoff.
2—the same distance as a running takeoff.
3—less distance than a running takeoff.
4—only 50 feet more distance than a running takeoff.

2600. GIVEN:

Pressure altitude.....4,000 ft.
Ambient temperature.....80° F

The takeoff distance to clear a 50–foot obstacle is (see Figures 47 and 48)

1—the same for a running or jump takeoff.
2—1,440 feet for a running takeoff.
3—1,225 feet for a jump takeoff.
4—less for a running takeoff than for a jump takeoff.

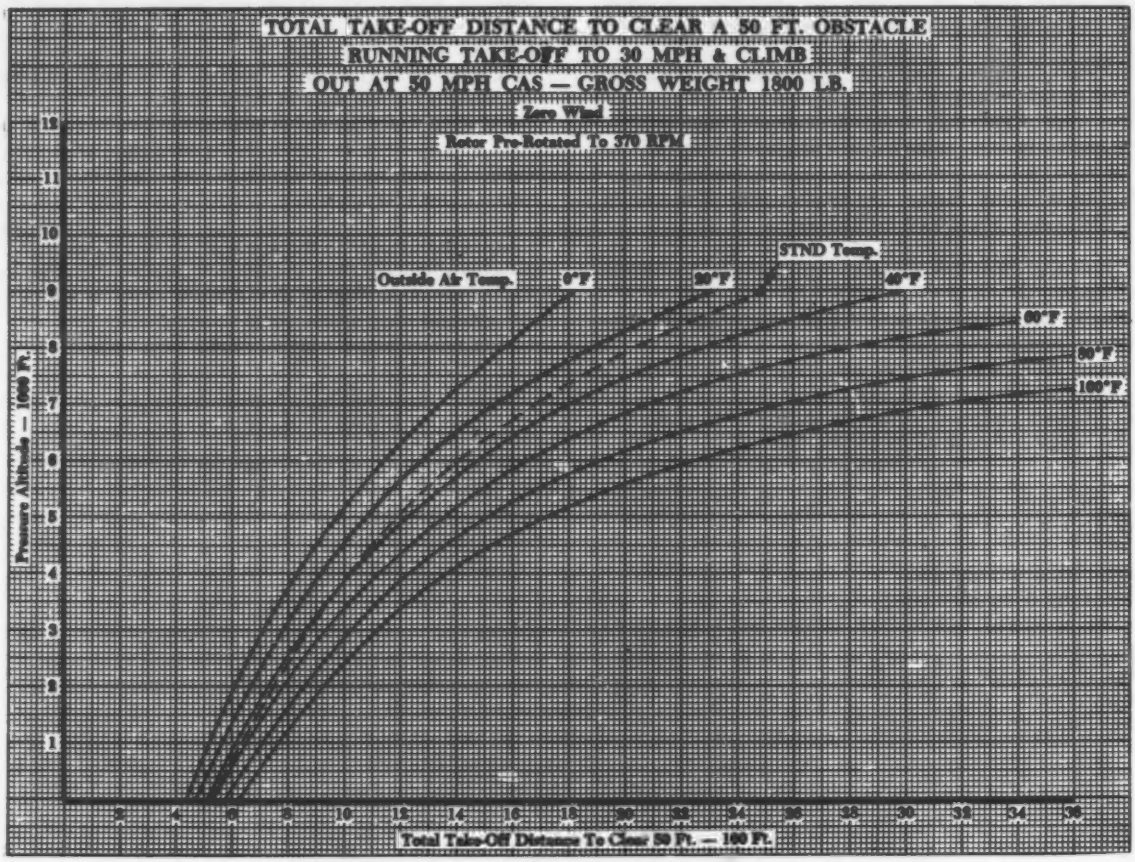


Figure 47

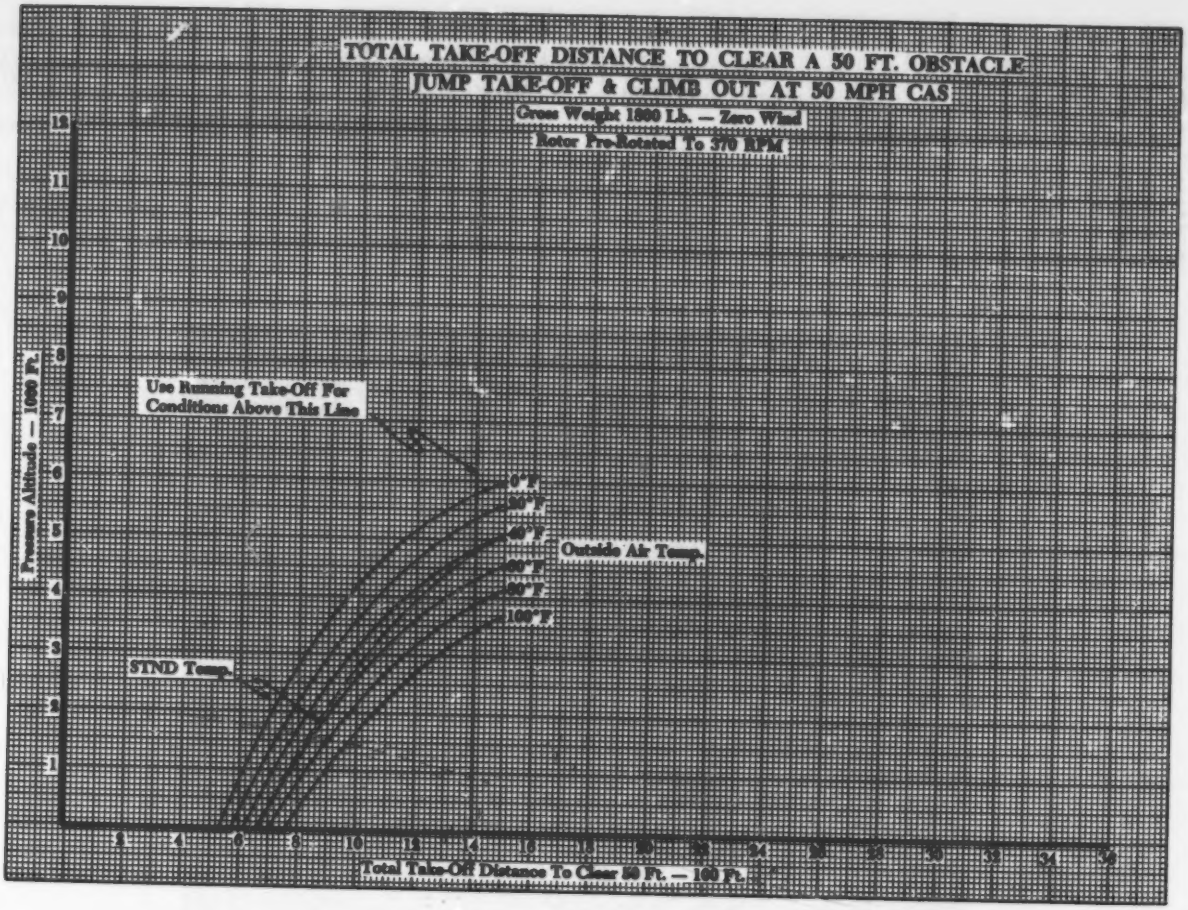

TOTAL TAKE-OFF DISTANCE TO CLEAR A 50 FT. OBSTACLE
JUMP TAKE-OFF & CLIMB OUT AT 50 MPH CAS
Gross Weight 1800 Lb. — Zero Wind
Rotor Pre-Rotated To 370 RPM
Use Running Take-Off For Conditions Above This Line
Outside Air Temp.
STND Temp.
Pressure Altitude — 1000 Ft.
Total Take-Off Distance To Clear 50 Ft. — 100 Ft.

Figure 48

READEX FICHE

2601. GIVEN:

Ambient temperature.....40° F
Pressure altitude.....1,000 ft.

The rate of climb would be (see Figure 49)

1—810 ft./min.
2—830 ft./min.
3—860 ft./min.
4—900 ft./min.

2602. GIVEN:

Ambient temperature.....60° F
Pressure altitude.....2,000 ft.

The rate of climb would be (see Figure 49)

1—705 ft./min.
2—630 ft./min.
3—755 ft./min.
4—745 ft./min.

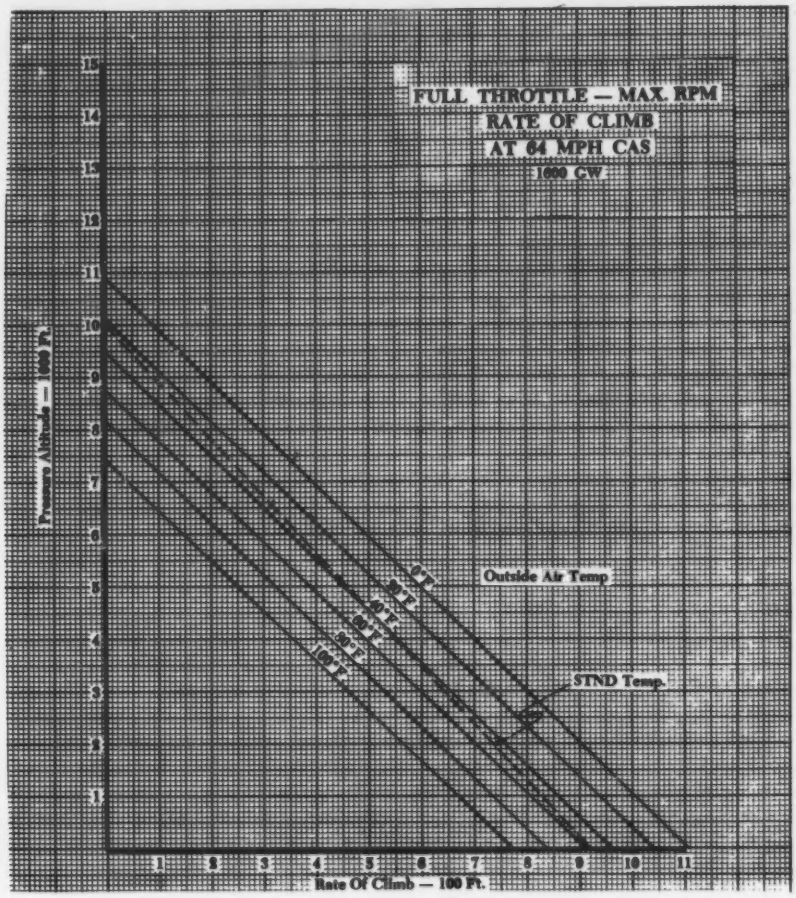


Figure 49

2603. GIVEN:

Ambient temperature.....60° F
Pressure altitude.....2,000 ft.

The rate of climb would be (see Figure 50)

1—480 ft./min.
2—515 ft./min.
3—540 ft./min.
4—575 ft./min.

2604. GIVEN:

Ambient temperature.....80° F
Pressure altitude.....2,500 ft.

What is the rate of climb? (See Figure 50.)

1—350 ft./min.
2—395 ft./min.
3—420 ft./min.
4—465 ft./min.

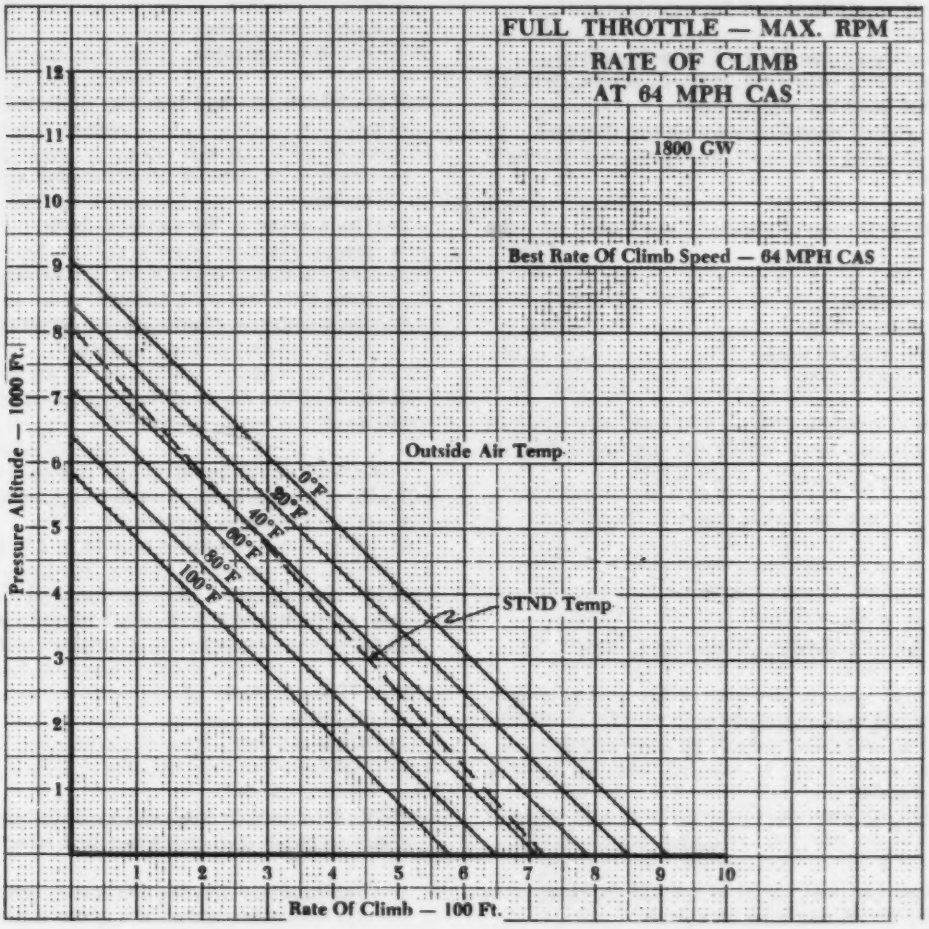


Figure 50

2605. That portion of the glider's total drag created by the production of lift is called

1—induced drag, and is greatly affected by changes in airspeed.
2—parasite drag, and is greatly affected by changes in airspeed.
3—induced drag, and is not affected by changes in airspeed.
4—profile drag, and is not affected by changes in airspeed.

2606. The best L/D ratio of a glider is a value that

1—varies depending upon the weight being carried.
2—varies depending upon the angle of attack required for different weights being carried.
3—remains constant regardless of airspeed changes.
4—remains constant and is independent of the weight being carried.

2607. The best L/D ratio of a glider occurs when parasite drag is

1—equal to total drag.
2—equal to induced drag.
3—greater than induced drag.
4—less than induced drag.

2608. A glider is designed for an L/D ratio of 22 to 1 at 50 MPH in calm air. What would the approximate glide ratio be with a direct headwind of 25 MPH?

1—44 to 1.
2—33 to 1.
3—22 to 1.
4—11 to 1.

2609. Which is true regarding aerodynamic drag?

1—Induced drag is a by-product of lift and is greatly affected by changes in airspeed.
2—Induced drag is created entirely by air resistance.
3—All aerodynamic drag is created entirely by the production of lift.
4—Parasite drag acts in direct proportion to the weight of the glider.

2610. At a given airspeed, what effect will an increase in air density have on lift and drag of a glider?

1—Lift and drag will decrease.
2—Lift will decrease but drag will increase.
3—Lift will increase but drag will decrease.
4—Lift and drag will increase.

2611. Both lift and drag would be increased when which of these devices are extended?

1—Flaps.
2—Spoilers.
3—Dive brakes.
4—Slots.

2612. If the airspeed of a glider is increased from 45 MPH to 90 MPH, the parasite drag will be

1—the same.
2—two times greater.
3—four times greater.
4—six times greater.

2613. If the indicated airspeed of a glider is decreased from 90 MPH to 45 MPH the induced drag will be

1—two times less.
2—four times less.
3—two times greater.
4—four times greater.

2614. Which is true regarding wing camber of a glider's airfoil?

1—There is no camber on either the upper or lower wing surface.
2—The camber is the same on both the upper and lower wing surface.
3—The camber is less on the upper wing surface than it is on the lower wing surface.
4—The camber is greater on the upper wing surface than it is on the lower wing surface.

2615. A glide ratio of 22 to 1 with respect to the air mass will be

1—11 to 1 in a tailwind and 44 to 1 in a headwind.
2—22 to 1 regardless of wind direction and speed.
3—22 to 1 but only in calm air.
4—11 to 1 in a headwind and 44 to 1 in a tailwind.

2616. If the glider's radius of turn is 175 feet at 40 MPH, what would the radius of turn be if the TAS is increased to 80 MPH while maintaining a constant angle of bank?

1—175 feet.
2—350 feet.
3—525 feet.
4—700 feet.

2617. In regard to the location of the glider's CG and its effect on glider spin characteristics, which is true?

1—The location of the CG does not affect the spin characteristics unless the glider exceeds the allowable gross weight.
2—If the CG is too far aft, spins will degenerate into high-speed spirals.
3—If the CG is too far forward, spin entry will be impossible.
4—If the CG is too far aft, a flat spin may develop.

2618. The CG of most gliders is located

1—ahead of the aerodynamic center of the wing to increase lateral stability.
2—behind the aerodynamic center of the wing to increase lateral stability.
3—ahead of the aerodynamic center of the wing to increase longitudinal stability.
4—behind the aerodynamic center of the wing to increase longitudinal stability.

2619. Loading a glider so that the CG exceeds the aft limits results in

1—loss of longitudinal stability, and causes the nose to pitch down at slow speeds.
2—loss of longitudinal stability, and causes the nose to pitch up at slow speeds.
3—excessive upward force on the tail, and causes the nose to pitch down.
4—excessive load factor in turns.

2620. With regard to the effects of spoilers and wing flaps, which is true if the glider's pitch attitude is held constant when such devices are being operated? (Disregard negative flap angles—above neutral position.)

1—Retracting flaps or extending spoilers will decrease the glider's rate of descent.
2—Retracting flaps or extending spoilers will increase the glider's rate of descent.
3—Retracting flaps will reduce the glider's stall speed.
4—Retracting spoilers will increase the glider's stall speed.

2621. If the angle of attack is increased beyond the critical angle of attack, the wing will no longer produce sufficient lift to support the weight of the glider

1—regardless of airspeed or pitch attitude.
2—unless the airspeed is greater than the normal stall speed.
3—unless the airspeed is greater than the normal stall speed and the pitch attitude is on or below the natural horizon.
4—unless the pitch attitude is on or below the natural horizon.

2622. What force causes the glider to turn in flight?

1—Horizontal component of lift.
2—Vertical component of lift.
3—Positive yawing movement of the rudder.
4—Increased lift on the lowered wing and decreased lift on the raised wing.

2623. GIVEN:

Glider A
Wing span.....51 ft.
Average wing chord.....4 ft.

Glider B
Wing span.....48 ft.
Average wing chord.....3.5 ft.

Determine the correct aspect ratio and its effect on performance at low speeds.

1—Glider A has an aspect ratio of 12.7, and will generate greater lift with less drag than glider B.
2—Glider A has an aspect ratio of 13.7, and will generate less lift with greater drag than glider B.
3—Glider B has an aspect ratio of 13.7, and will generate greater lift with less drag than glider A.
4—Glider B has an aspect ratio of 12.7, and will generate less lift with greater drag than glider A.

2624. GIVEN:

Glider A
Wing span.....48 ft.
Average wing chord.....4.5 ft.

Glider B
Wing span.....54 ft.
Average wing chord.....3.7 ft.

Determine the correct aspect ratio and its effect on performance at low speeds.

1—Glider A has an aspect ratio of 10.6, and will generate greater lift with less drag than glider B.
2—Glider A has an aspect ratio of 14.5, and will generate less lift with greater drag than glider B.
3—Glider B has an aspect ratio of 14.5, and will generate greater lift with less drag than glider A.
4—Glider B has an aspect ratio of 10.6, and will generate less lift with greater drag than glider A.

2625. If the tow releases fail to function on both the glider and towplane, the glider pilot should plan to land in which manner?

1—Fly the final approach in low-tow position and land before the towplane, but use no spoilers or brakes during the landing roll until after the towplane touches down.
2—Fly the final approach in high-tow position and extend the spoilers just prior to the towplane's touchdown.
3—Fly the final approach to the side of the towplane's flightpath and extend the spoilers when the towplane is approximately 5 feet above the ground.
4—Fly the final approach in low-tow position and land before the towplane, applying spoilers or brakes before the towplane touches down.

2626. What corrective action should the sailplane take during takeoff if the towplane is still on the ground and the sailplane is airborne and drifting to the left?

1—Crab into the wind by holding upwind (right) rudder pressure.
2—Establish a right wing low drift correction to remain in the flightpath of the towplane.
3—Wait until the towplane becomes airborne before attempting to establish a drift correction.
4—Crab into the wind to maintain a position directly behind the towplane.

2627. During an aerotow, the sailplane moves to one side of the towplane's flightpath. This was most likely caused by

1—flying the sailplane in a wing-low attitude or holding unnecessary rudder pressure.
2—variations in the heading of the towplane.
3—entering wingtip vortices created by the towplane.
4—the towplane's slipstream striking the side of the sailplane's fuselage.

2628. In which manner should the sailplane be flown while turning during an aerotow?

1—By using a slightly steeper bank than the towplane with the sailplane's nose pointed to the outside of the turn.
2—By flying outside the towplane's flightpath.
3—By banking at the same point in space where the towplane banked and using the same degree of bank and rate of roll.
4—By flying inside the towplane's flightpath.

2629. When should the wing runner raise the glider's wing to the level position in preparation for takeoff?

1—As soon as the towline is attached.
2—When the glider pilot is seated and has fastened the safety belt.
3—When the towplane pilot fans the towplane's rudder.
4—After the glider pilot gives a thumbs-up signal to take up towline slack.

2630. Which is an advantage of using a CG hook for a winch tow rather than the nose hook?

1—The control stick force (elevators) is less with the CG hook.
2—The sailplane is less likely to pitch up should the towline or a safety link break.
3—A shallower climb angle can be used during launch.
4—The wing loading is increased.

2631. Select the true statement concerning oxygen systems that are often installed in sailplanes.

1—Most civilian aircraft oxygen systems use low-pressure cylinders for oxygen storage.
2—In case of a malfunction of the main oxygen system a bailout bottle may serve as an emergency oxygen supply.
3—When aviation breathing oxygen is not available, hospital or welder's oxygen serves as a good substitute.
4—When the oxygen system is being serviced on the ground or used in flight there is no real danger in smoking.

2632. Which is true regarding the disassembly of a glider for transporting purposes or the assembly of a glider for flight?

1—It may be accomplished by the pilot.
2—It must be accomplished by a certificated mechanic.
3—It must be accomplished under the supervision of an FAA maintenance inspector.
4—It may be accomplished by the pilot only if supervised by certificated mechanic.

2633. What is the proper airspeed to use when flying between thermals on a cross-country flight against a headwind?

1—The best L/D speed increased by one-half the estimated wind velocity.
2—The minimum sink speed increased by one-half the estimated wind velocity.
3—The best L/D speed decreased by one-half the estimated wind velocity.
4—Maneuvering speed decreased by one-half the estimated wind velocity.

2634. Which airspeed should be used when circling within a thermal?

1—Best L/D speed.
2—Minimum sink speed.
3—Maneuvering speed.
4—Best glide speed.

2635. What is the proper speed to fly when passing through lift with no intention to work the lift?

1—Maximum safe speed.
2—Minimum central speed.
3—Best L/D speed.
4—Minimum sink speed.

2636. Which is true regarding the effect on a glider's performance by the addition of ballast or weight?

1—The glide ratio at a given airspeed will increase.
2—A higher airspeed is required to obtain the same glide ratio as when lightly loaded.
3—The heavier the glider is loaded, the less the glide ratio will be at all airspeeds.
4—A heavily loaded glider takes a longer time than one lightly loaded to fly from one thermal to the next.

2637. The reason for retaining water ballast while thermals are strong, and dumping the water when thermals weaken, is to

1—increase the rate of descent.
2—decrease the rate of descent.
3—decrease forward speed.
4—increase forward speed.

2638. The spoilers should be in what position when operating in a strong wind?

1—Extended during both a landing roll or ground operation.
2—Retracted during both a landing roll or ground operation.
3—Extended during a landing roll, but retracted during a ground operation.
4—Retracted during a landing roll, but extended during a ground operation.

2639. When flying at the recommended speed-to-fly, the glider pilot can expect the

1—fastest cross-country speed.
2—longest distance on a cross-country flight.
3—flattest glide angle for a given vertical motion of the air.
4—best glide speed for cross-country flight.

2640. Which procedure can be used to increase forward speed on a cross-country flight?

1—Maintain best glide speed plus or minus one-half the estimated wind velocity.
2—Maintain minimum sink speed plus or minus one-half the estimated wind velocity.
3—Use water ballast while thermals are strong and dump the water when thermals are weak.
4—Use water ballast while thermals are weak and dump the water when thermals are strong.

2641. When flying into a headwind, penetrating speed is the glider's

1—speed-to-fly.
2—minimum sink speed.
3—speed-to-fly plus half the estimated wind velocity.
4—design maneuvering speed.

2642. When flying into a strong headwind on a long final glide or a long glide back to the airport, the recommended speed to use is the

1—minimum sink speed.
2—speed-to-fly plus half the estimated windspeed at the glider's flight altitude.
3—airspeed which produces the flattest glide angle for the convective condition regardless of the wind.
4—best glide speed.

2643. During an auto launch, the pitch angle of the glider should not exceed

1—10° at 50 feet, 20° at 100 feet, and 45° at 200 feet.
2—15° at 50 feet, 30° at 100 feet, and 45° at 200 feet.
3—15° at 50 feet, 20° at 100 feet, and 40° at 200 feet.
4—20° at 50 feet, 30° at 100 feet, and 45° at 200 feet.

2644. To stop pitch oscillation during a winch launch, the pilot should

1—increase the back pressure on the control stick and steepen the angle of climb.
2—extend and retract the spoilers several times until the oscillations subside.
3—relax the back pressure on the control stick and shallow the angle of climb.
4—apply back stick pressure when the nose pitches downward and forward pressure when the nose pitches up.

2645. Which would cause pitch oscillations or porpoising during a winch launch?

1—Excessive winch speed.
2—Insufficient winch speed.
3—Excessive slack in the towline.
4—Insufficient up-elevator control pressure.

2646. The towrope breaks when at the steepest segment of the climb during a winch launch. To recover to a normal gliding attitude, the pilot should

1—lower the nose immediately and open the spoilers to keep from gaining excessive airspeed in the recovery dive.
2—move the stick fully forward immediately and hold it there until the nose crosses the horizon.
3—relax the back stick pressure to avoid excessive loss of altitude.
4—apply forward pressure until the buffeting sound and vibration disappear.

2647. Which is true when the glider is operated in the high-performance category and the dive brakes/spoilers are in the closed position? (See Figure 51.)

1—The wings-level stall speed is 40 MPH.
2—The design dive speed is 150 MPH.
3—The never-exceed speed is 150 MPH.
4—The design maneuvering speed is 76 MPH.

2648. If the glider's airspeed is 70 MPH and a vertical gust of +30 ft./sec. is encountered, which would most likely occur? (See Figure 51.)

1—The glider would momentarily stall.
2—The maximum load factor would be exceeded.
3—The glider would gain 1,800 feet in 1 minute.
4—The airspeed would increase to 100 MPH.

2649. Regarding the effect of loading on glider performance, a heavily loaded glider would

1—have slower forward speed than when lightly loaded.
2—make better flight time on a cross-country flight between thermals than when lightly loaded.
3—have a lower glide ratio than when lightly loaded.
4—have the same stalling speed as when lightly loaded.

2650. How much altitude will a glider lose in a distance of 2 SM if the L/D ratio is 24:1? (Assume calm stable conditions.)

1—220 feet.
2—440 feet.
3—880 feet.
4—1,440 feet.

2651. With regard to two or more gliders flying in the same thermal, which is true?

1—All turns should be to the right.
2—Turns should be in the same direction as the highest glider.
3—Low performance gliders have the right-of-way over high performance gliders.
4—Turns should be made in the same direction as the first glider to enter the thermal.

2652. Which is true regarding the direction in which turns should be made during slope soaring?

1—All turns should be made downwind toward the slope.
2—The upwind turn should be made to the left; the downwind turn should be made to the right.
3—All reversing turns should be made to the left.
4—All reversing turns should be made into the wind away from the slope.

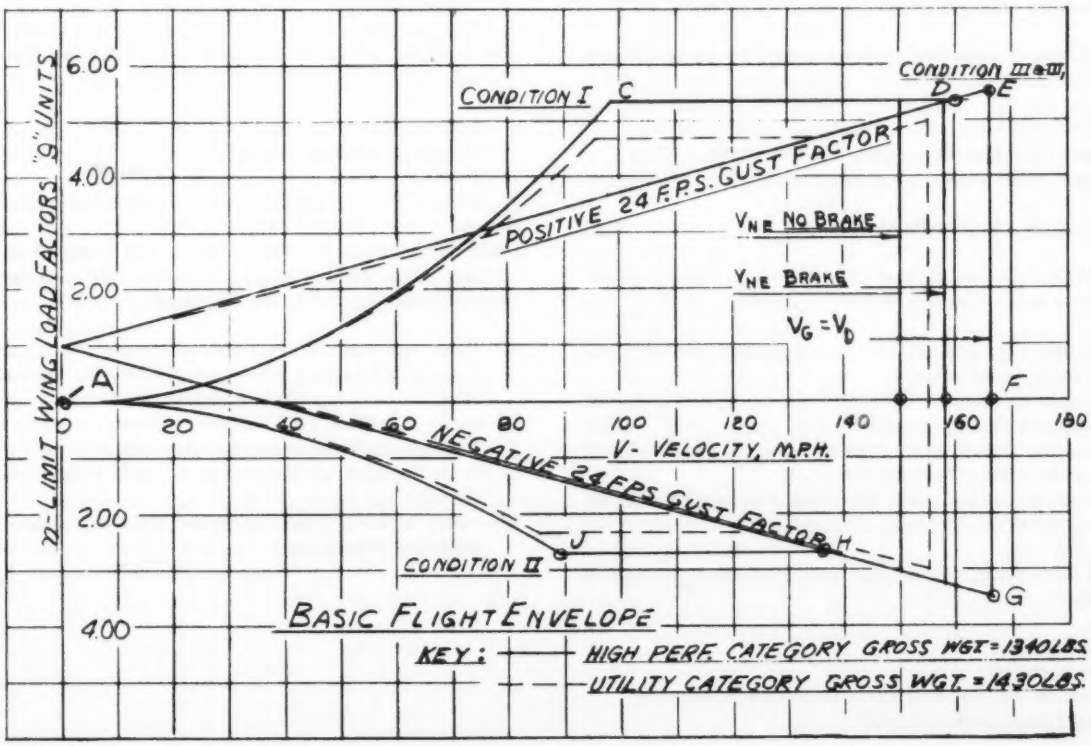


Figure 51

2653. Which is true regarding minimum control airspeed while thermalling?

1—Minimum control airspeed may coincide with minimum sink airspeed.
2—Minimum control airspeed is greater than minimum sink airspeed.
3—Minimum control airspeed never coincides with minimum sink airspeed.
4—Minimun control airspeed is a speed at which stalls can be avoided.

2654. In which situation is a hazardous stall more likely to occur if inadequate airspeed allowance is made for wind velocity gradient?

1—During the approach to a landing.
2—During takeoff and climb while on aerotow.
3—While thermalling at high altitudes.
4—While flying from one thermal to another.

2655. Looseness in a glider's flight control linkage or attachments could result in

1—flutter while flying at near maximum speed in turbulence.
2—loss of control during an aerotow in turbulence.
3—increased stalling speed.
4—excessive vibration at any speed.

2656. Which airspeed should be used to obtain maximum distance over the ground?

1—Minimum sink speed plus or minus one-half of the windspeed.
2—Best L/D speed plus or minus one-half of the windspeed.
3—Minimum sink speed with no correction for windspeed.
4—Best L/D speed with no correction for windspeed.

2657. The maximum airspeed at which abrupt and full deflection of the controls would not cause structural damage to a glider is called the

1—penetration speed.
2—speed-to-fly.
3—maneuvering speed.
4—never-exceed speed.

2658. A left side slip is used to counteract a crosswind drift during the final approach for landing. An over-the-top spin would most likely occur if the controls were used in which of the following ways?

1—Holding the stick too far forward and applying full left rudder.
2—Holding the stick in the neutral position and applying full right rudder.
3—Holding the stick too far to the left and applying full left rudder.
4—Holding the stick too far back and applying full right rudder.

2659. What would be a proper action or procedure to use if you are getting too low on a cross-country flight in a sailplane?

1—Continue on course until descending to 1,000 feet above the ground and then plan your landing approach.
2—Fly directly into the wind and make a straight-in approach at the end of the glide.
3—Continue on course until descending to 500 feet, then select a field and confine the search for lift to an area within gliding range of a downwind leg for the field you have chosen.
4—Have a suitable landing area selected upon reaching 2,000 feet AGL, and a specific field chosen upon reaching 1,500 feet AGL.

2660. If the glider has drifted a considerable distance from the airport while soaring, the best speed to use to reach the airport when flying into a headwind is the

1—minimum sink speed.
2—speed-to-fly plus half the estimated windspeed at the glider's altitude.
3—maximum penetration speed plus half the estimated windspeed at the glider's altitude.
4—best glide speed.

2661. Which is a recommended procedure for an off-field landing?

1—A recommended landing site would be a pasture.
2—If the field slopes, it is usually best to land uphill, even with a tailwind.
3—Always land into the wind even if you have to land downhill on a sloping field.
4—When landing, it is best to make a straight-in high approach using spoilers or S turns to lose altitude.

2662. Which would most likely ensure a safe off-field landing?

1—Maintaining an approach airspeed of at least 10 percent above stall speed.
2—Using an overhead circling approach instead of a standard pattern.
3—Landing into the wind, regardless of the type of terrain.
4—Maintaining an approach airspeed of at least 20 percent above stall speed.

2663. On the basis of the following information, what should the auto/winch speed be when the glider reaches an altitude of 200 feet ?

Glider's max. auto/winch tow speed.....66 MPH
Surface wind (direct headwind).....5 MPH
Wind gradient.....4 MPH

The auto/winch speed should be

1—61 MPH.
2—56 MPH.
3—46 MPH.
4—42 MPH.

2664. The glider has a normal L/D of 23:1 at an airspeed of 50 MPH. What would be the effective L/D with respect to the ground with a 10 MPH headwind?

1—25:1
2—23:1
3—18.4:1.
4—16.1:1.

2665. The glider has a normal L/D of 23:1 at an airspeed of 50 MPH. What would be the effective L/D with respect to the ground with a 10 MPH tailwind?

1—28:1.
2—25:1.
3—23:1.
4—18:1.

2666. If the airspeed is 70 MPH and the sink rate is 5.5 ft./sec., what is the effective L/D with respect to the ground? (See Figure 52.)

1—19:1.
2—20:1.
3—21:1.
4—23:1.

2667. If the airspeed is 50 MPH and the sink rate is 3.2 ft./sec., what is the effective L/D with respect to the ground? (See Figure 52.)

1—19:1.
2—20:1.
3—21:1.
4—23:1.

2668. Which of the following would be the correct control usage if, during a downwind landing roll, the glider swerves to the left?

1—Apply full right rudder and full right stick.
2—Apply full left rudder and full right stick.
3—Apply full right rudder and full back stick.
4—Apply full left rudder and full back stick.

2669. To stop a ground loop to the left after landing a glider, it would be best to lower the

1—nose skid to the ground and apply wheel brake.
2—left wing to compensate for crosswind.
3—right wing in order to shift the CG.
4—tail to the ground and apply wheel brake.

2670. When flying on a heading of west from one thermal to the next, the airspeed is increased to the speed-to-fly with the wings level. What will the conventional magnetic compass indicate while the airspeed is increasing?

1—A turn toward the south.
2—A turn toward the north.
3—Straight flight on a heading of 270°.
4—Straight flight on a heading of 230°.

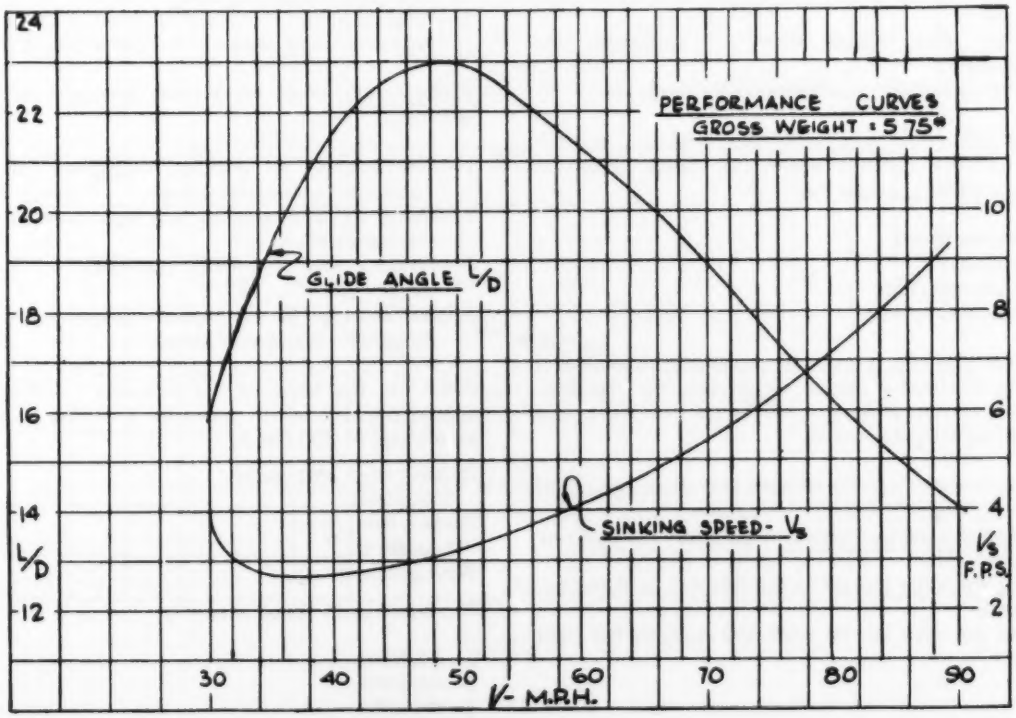


Figure 52

2671. In the Northern Hemisphere, if a sailplane is accelerated or decelerated, the magnetic compass will normally indicate

1—a turn toward north while decelerating on an east heading.
2—correctly only when on a north or south heading.
3—a turn toward south while accelerating on a west heading.
4—a turn momentarily, with changes in airspeed on any heading.

2672. When flying on a heading of east from one thermal to the next, the airspeed is increased to the speed-to-fly with wings level. What will the conventional magnetic compass indicate while the airspeed is increasing?

1—A turn toward the south.
2—A turn toward the north.
3—Straight flight on a heading of 090°.
4—Straight flight on a heading of 120°.

2673. What consideration should be given in the choice of a towplane for use in aerotows?

1—Towplane's low-wing loading and low-power loading.
2—L/D of the glider to be towed.
3—Gross weight of the glider to be towed.
4—Stall speed of the towplane.

2674. Which is true regarding the use of glider tow hitches?

1—The use of a nose hitch for an autotow or winch tow minimizes pitchup tendency should the towline break during launch.
2—The use of a nose hitch for an auto or winch launch reduces structural loading on the tail assembly compared to the use of a CG hitch.
3—The use of a CG hitch for aerotows allows better directional control at the start of the launch than the use of a nose hitch.
4—The use of a CG hitch for auto or winch tows allows the sailplane greater altitude for a given line length.

2675. During aerotow takeoffs in crosswind conditions, the glider starts drifting downwind after becoming airborne and before the towplane lifts off. The glider pilot should

1—crab into the wind to remain in the flightpath of the towplane.
2—not correct for a crosswind during this part of the takeoff.
3—hold upwind rudder in order to crab into the wind and remain in the flightpath of the towplane.
4—establish a wing-low drift correction to remain in the flightpath of the towplane.

2676. During an aerotow, if a large amount of slack develops in the towline, the glider pilot should correct this situation by

1—making a shallow-banked coordinated turn to either side.
2—increasing the glider's pitch attitude until the towline becomes taut.
3—yawing the glider's nose to one side with rudder while keeping the wings level with the ailerons.
4—lowering the glider's nose to remove the slack without breaking the towline.

2677. During an aerotow, is it good operating practice to release from a low-tow position?

1—Yes. Low-tow position is the correct position for releasing from the towplane.
2—No. The towline may snap forward and strike the towplane after release.
3—No. The glider will enter the towplane's slipstream when the pilot makes the normal climbing turn after release.
4—No. The tow ring may strike and damage the glider after release.

2678. When preparing for an autotow with a strong crosswind, where should the glider and towrope be placed?

1—Directly behind the tow car and crabbed into the wind with the wing runner on the upwind wingtip.
2—Straight behind the tow car.
3—Obliquely to the line of takeoff on the downwind side of the tow car.
4—Obliquely to the line of takeoff on the upwind side of the tow car.

2679. During an aerotow, moving from the inside to the outside of the towplane's flightpath during a turn will cause the

1—glider's airspeed to decrease, resulting in a tendency to descend.
2—glider's airspeed to increase, resulting in a tendency to climb.
3—towline to slacken.
4—towplane to stall.

2680. At what point during an auto tow should the glider pilot establish the maximum pitch attitude for the climb?

1—200 feet above the ground.
2—Immediately after takeoff.
3—100 feet above the ground.
4—Between 300 and 400 feet above the ground.

2681. To signal the glider pilot during an aerotow to release immediately, the tow pilot will

1—rock the towplane's wings.
2—fishtail the towplane.
3—alternately raise and lower the towplane's pitch attitude.
4—alternately yaw the towplane to the left and right.

2682. Is it good operating practice to release from a low-tow position?

1—No. The glider will enter the towplane's slipstream when the pilot makes the normal climbing turn after release.
2—No. The towline may snap back and strike the towplane.
3—No. The tow ring may strike and damage the glider after release.
4—Yes. Low-tow position is the correct position for releasing from the towplane.

2683. What corrective action should be taken, if while thermalling at minimum sink speed in turbulent air, the left wing drops while turning to the left?

1—Apply more opposite (right) aileron pressure than opposite (right) rudder pressure to counteract the overbanking tendency.
2—Apply opposite (right) rudder pressure to slow the rate of turn.
3—Lower the nose before applying opposite (right) aileron pressure.
4—Apply opposite (right) aileron pressure to counteract the overbanking tendency.

2684. Minimum sink speed is the airspeed which results in the

1—least loss of altitude in a given time.
2—least loss of altitude in a given distance.
3—shallowest glide angle in any convective situation.
4—best glide ratio in areas of heavy sink.

2685. Unless adequate speed control is maintained during the turn to base and the final approach for a landing into the wind, which would most likely occur if a steep wind gradient existed?

1—The desired landing spot would be undershot or the glider would stall.
2—The airspeed on final approach would increase, causing the glider to overshoot the desired landing spot.
3—The wingtip on the outside of the turn would stall before the wingtip on the inside of the turn.
4—The glider would tend to roll out of the turn.

2686. A rule of thumb for flying a final approach is to maintain a speed that is

1—twice the glider's stall speed plus half the estimated windspeed.
2—50 percent above the glider's stall speed plus half the estimated windspeed.
3—twice the glider's stall speed, regardless of windspeed.
4—50 percent above the glider's stall speed, regardless of windspeed.

2687. While on final approach, to effectively execute a spot landing, the glider should be aimed at

1—the intended touchdown point.
2—a point approximately 25 yards short of the intended touchdown point.
3—a point approximately 25 yards beyond the intended touchdown point.
4—a point approximately 50 yards short of the intended touchdown point.

2688. What should be expected when making a downwind landing?

1—The likelihood of undershooting the intended landing spot and a faster airspeed at touchdown.
2—The likelihood of overshooting the intended landing spot and a faster groundspeed at touchdown.
3—The likelihood of undershooting the intended landing spot and a faster groundspeed at touchdown.
4—A faster airspeed at touchdown, a longer ground roll, and better control throughout the landing roll.

2689. What corrective action should be taken during a landing if the glider pilot makes the roundout too soon while using spoilers?

1—Extend and retract the spoilers alternately to get the glider to settle smoothly.
2—Leave the spoilers extended and lower the nose slightly.
3—Retract the spoilers and leave them retracted until after touchdown.
4—Retract the spoilers until the glider begins to settle again, then extend the spoilers.

2690. If the airspeed of a glider is decreased from 60 MPH to 54 MPH, the lift/drag ratio would (see Figure 53)

1—increase and the rate of sink would increase.
2—increase and the rate of sink would decrease.
3—decrease and the rate of sink would decrease.
4—decrease and the rate of sink would increase.

2691. If the airspeed of a glider is increased from 54 MPH to 60 MPH, the lift/drag ratio would (see Figure 53)

1—decrease and the rate of sink would increase.
2—increase and the rate of sink would decrease.
3—decrease and the rate of sink would decrease.
4—increase and the rate of sink would increase.

2692. If a glider weighs 1,040 pounds, what is the minimum sink speed and rate of sink? (See Figure 53.)

1—38 MPH and 2.6 ft./sec.
2—42 MPH and 3.1 ft./sec.
3—38 MPH and 3.6 ft./sec.
4—42 MPH and 4.7 ft./sec.

2693. If a glider weighs 1,040 pounds and an indicated airspeed of 55 MPH is maintained in still air, how much altitude will be lost while traveling 1 mile? (See Figure 53.)

1—120 feet.
2—240 feet.
3—310 feet.
4—350 feet.

2694. Which is true regarding ridge soaring with the wind direction perpendicular to the ridge?

1—When very close to the surface of the ridge, the glider's speed should be reduced to the minimum sink speed.
2—If the glider drifts downwind from the ridge and sinks slightly lower than the crest of the ridge, the glider should be turned away from the ridge and a high speed attained.
3—When the wind and lift are very strong on the windward side of the ridge, a weak sink condition will exist on the leeward side.
4—When flying between peaks along a ridge, the pilot can expect a significant decrease in wind and lift.

2695. Which is true regarding the effect of fronts on soaring conditions?

1—Good soaring conditions usually exist after passage of a warm front.
2—Frequently the air behind a cold front provides excellent soaring for several days.
3—Excellent soaring conditions usually exist in the cold air ahead of a warm front.
4—A slow moving front provides the strongest lift.

2696. Which thermal index would predict the best probability of good soaring conditions?

1— +10.
2— +5.
3— -5.
4— -10.

DESIGN DATA

Wing Span	51'	Empty Weight	600 lbs.
Length	25'9"	Gross Weight	1,040 lbs.
Height	9' 3-½"	Wing Area	219.5 sq. ft.
Aspect Ratio	11.85	Wing Loading	4.74 psf

PERFORMANCE

Max. Speed	98 mph	Stall (Dual)	35 mph
Airplane Tow	98 mph	L/D mph Solo	22.25 to 1 at 45
Auto Winch	69 mph	L/D mph Dual	22.25 to 1 at 52
Dive Brake Extend. Max.	98 mph	Sink Speed Solo	2.6 fps at 38
Stall (solo)	31 mph	Sink Speed Dual	3.1 fps at 42

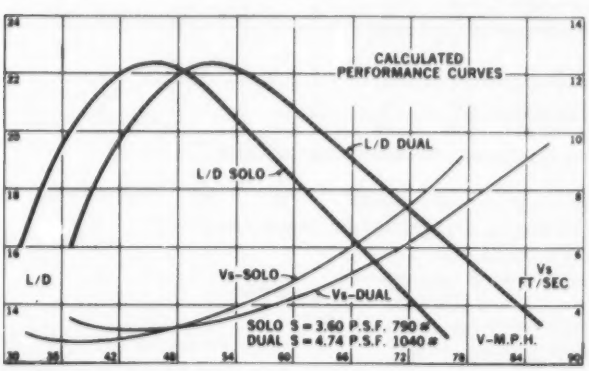


Figure 53

2697. Refer to the sounding taken at 0900 GMT from 2,500 feet to 15,000 feet, as shown on the Pseudo-Adiabatic Chart (see Figure 54). What minimum surface temperature is required for instability to occur and for good thermals to develop from the surface to 15,000 feet MSL?

1—90° F.
2—58° F.
3—68° F.
4—80° F.

2698. Refer to the Pseudo-Adiabatic Chart (Figure 54). At the 0900 GMT sounding and the line plotted from the surface to 10,000 feet, what temperature must exist at the surface for instability to take place between these altitudes?

1—Any temperature less than 68° F.
2—Any temperature more than 68° F.
3—Any temperature less than 43° F.
4—Any temperature between 43° F and 68° F.

2699. Refer to the Pseudo-Adiabatic Chart (Figure 54) and the soundings taken at 1400 GMT. Is the atmosphere stable or unstable and at what altitudes?

1—Stable from 10,000 to 13,000 feet.
2—Unstable from 10,000 to 13,000 feet.
3—Stable from 6,000 to 10,000 feet.
4—Neutrally stable from 2,500 to 6,000 feet.

2700. Refer to the Pseudo-Adiabatic Chart (Figure 54). Using the 1400 GMT soundings, does an inversion exist, and if so at what altitudes?

1—Yes, between 2,500 and 6,000 feet.
2—No, there is no inversion shown.
3—Yes, between 10,000 and 13,000 feet.
4—Yes, between 13,000 and 15,000 feet.

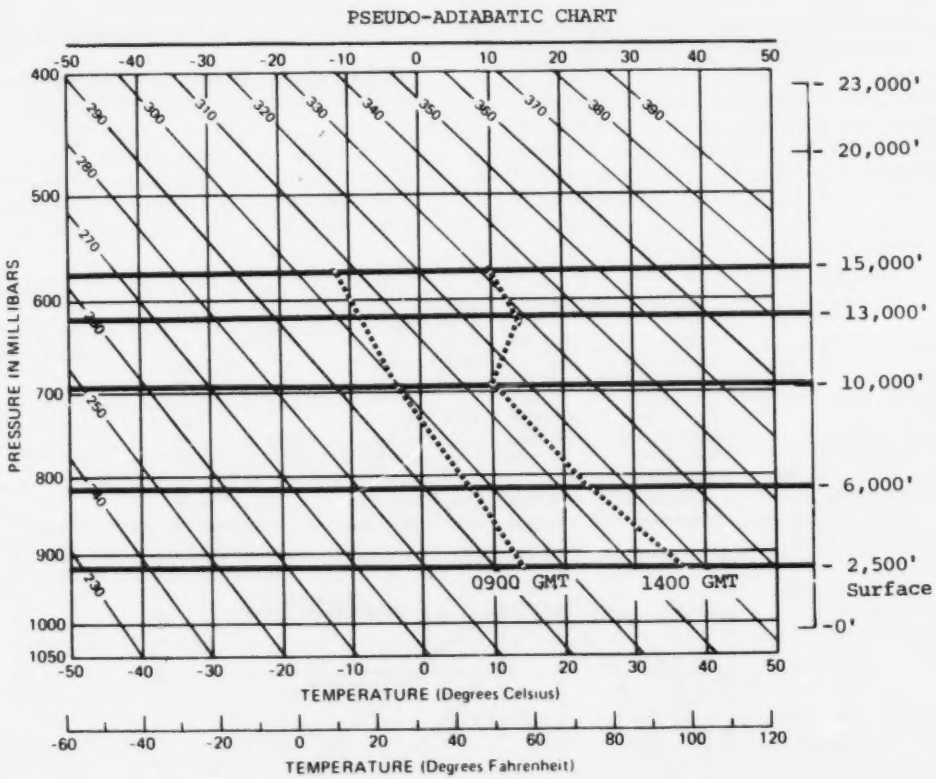


Figure 54

2701. Superheat is a term used to describe the condition which exists

1—when the temperature of the surrounding air is greater than the temperature of the surface of the envelope.
2—when the sun heats the envelope surface to a temperature at least 10° greater than the surrounding air.
3—relative to the difference in temperature between the gas in the envelope and the surrounding air caused by the sun.
4—when the surrounding air is at least 10° F warmer than the gas in the envelope.

2702. Regarding lift as developed by a hot–air balloon, which is true?

1—The higher the temperature of the ambient air, the greater the lift for any given envelope temperature.
2—The greater the difference between the temperature of the ambient air and the envelope air, the greater the lift.
3—The smaller the difference between the temperature of the ambient air and the envelope air, the greater the lift.
4—The smaller the spread between the temperature of the ambient air and the dew point the greater the lift.

2703. The lifting forces which act on a hot–air balloon are primarily the result of the interior air

1—temperature being greater than ambient temperature.
2—temperature being less than ambient temperature.
3—pressure being greater than ambient pressure.
4—pressure being less than ambient pressure.

2704. What is the relationship of false lift to the wind?

1—False lift increases as the wind accelerates the balloon to the same speed as the wind.
2—False lift exists only if the surface winds are calm.
3—False lift increases if the vertical velocity of the balloon increases.
4—False lift decreases as the wind accelerates the balloon to the same speed as the wind.

2705. What causes false lift which sometimes occurs during launch procedures?

1—Closing the maneuvering vent too rapidly.
2—Excessive temperature within the envelope.
3—Opening the blast valve prematurely during the launch sequence.
4—Venturi effect of the wind on the envelope.

2706. False lift occurs whenever a balloon

1—takes off behind a shelter.
2—ascends rapidly.
3—ascends into air moving faster than the air below.
4—ascends due to solar assistance.

2707. Propane is preferred over butane for fuel in hot–air balloons because

1—it has a higher boiling point.
2—butane has a consistently higher vapor pressure for a given temperature.
3—it has a lower boiling point.
4—butane is very explosive under pressure.

2708. Which is a good way to detect a fuel leak?

1—Sight.
2—Use of a small flame.
3—Use of smell and sound.
4—Check fuel pressure gauge.

2709. Which action would be appropriate if a small leak develops around the stem of the tank valve, and no other tanks have sufficient fuel to reach a suitable landing field?

1—Turn off the leaking tank and attempt a landing using the remaining vapor from other tanks.
2—Turn the leaking tank handle to the full open position.
3—Turn off the tank, then slowly re–open to reseat the seal.
4—Warm the tank valve leak with your bare hand.

2710. To respond to a small leak around the stem of a Rego blast valve in a single burner system balloon, one should

1—turn off the fuel system and make an immediate landing.
2—continue operating the blast valve making very small quick blasts until a good landing field appears.
3—turn off the fuel tank, lock the blast valve open, then continue flying using the tank valve until an acceptable landing field appears.
4—continue operating the blast valve, making long infrequent blasts, opening the handle slightly to reduce leakage, until a good landing field appears.

2711. The term to weigh–off as used in ballooning means to determine the

1—amount of sand ballast required for an ascent to a preselected altitude.
2—amount of gas required for an ascent to a preselected altitude.
3—standard weight and balance of the balloon.
4—static equilibrium of the balloon as loaded for flight.

2712. The weigh–off procedure is useful because the

1—pilot knows before liftoff what the maximum flight temperature will be.
2—pilot can adjust the altimeter to the correct setting.
3—ground crew can assure that downwind obstacles are cleared.
4—pilot will learn what the equilibrium conditions are prior to being committed to fly.

2713. The practice of allowing the ground crew to lift the balloon into the air is

1—an acceptable method to use on a hot day since it would reduce the amount of heat required to lift off.
2—considered to be a good operating practice when obstacles must be cleared shortly after lift-off.
3—unsafe because it can lead to a sudden landing at an inopportune site just after lift-off.
4—a safe way to reduce stress on the envelope.

2714. What should a pilot do if a small hole is seen in the fabric during inflation?

1—Continue the inflation and make a mental note of the location of the hole for later repair.
2—Instruct a groundcrew member to inspect the hole, and if under 5 inches in length, continue the inflation.
3—Consult the flight manual to determine if the hole is within acceptable damage limits established for the balloon being flown.
4—Make a field repair with self-adhesive balloon fabric or duct tape, then continue inflation.

2715. What effect, if any, does ambient temperature have on propane tank pressure?

1—It has no effect.
2—As temperaturee decreases, propane tank pressure decreases.
3—As temperature decreases, propane tank pressure increases.
4—Temperature only affects propane tank pressure when it is above 80 F and it causes the tank pressure to decrease.

2716. What is the weight of propane?

1—4.2 pounds per gallon.
2—6 pounds per gallon.
3—7.5 pounds per gallon.
4—10 pounds per gallon.

2717. If ample fuel is available, within which temperature range will propane fuel vaporize sufficiently to provide enough fuel pressure for burner operation during flight?

1—0 F to 30 F.
2—30 F to 90 F.
3—10 F to 30 F.
4—0 F to 15 F.

2718. While in flight, ice begins forming on the outside of the fuel tank in use. This would most likely be caused by

1—water in the fuel.
2—a leak in the fuel line.
3—using the wrong kind of fuel.
4—vaporized fuel instead of liquid fuel being drawn from the tank into the main burner.

2719. Why is false lift dangerous?

1—The balloon will ascend so rapidly the envelope will be overstressed.
2—Pilots are not aware of its effect until the burner sound changes.
3—To commence a descent, the venting of air will nearly collapse the envelope.
4—When the balloon horizontal speed reaches the windspeed, the balloon could descend into obstructions downwind.

2720. A pilot should be aware that drag ropes constructed of hemp or nylon

1—are very dangerous and should not be used in free balloons under any circumstances.
2—should be a maximum of 100 feet long and used only in gas balloons.
3—can conduct electricity when contacting powerlines carrying 600 volts or more current if they are not clean and dry.
4—can be considered safe because they will not conduct electricity.

2721. One advantage nylon rope has over manila rope is that it

1—is not affected by strong sunlight.
2—will not stretch.
3—is nearly three times as strong.
4—does not tend to snap back if it breaks.

2722. The purpose of the preheating coil as used in hot-air balloons is to

1—warm the fuel tanks for more efficient fuel flow.
2—vaporize the fuel for more efficient burner operation.
3—prevent ice from forming in the fuel lines.
4—preheat the air entering the burner can(s).

2723. Why is nylon rope good for tethering a balloon?

1—It stretches under tension, but recovers to normal size when tension is removed, giving it excellent shock absorbing qualities.
2—It does not stretch under tension.
3—It is not flexible and therefore can withstand greater tension without breaking.
4—It weighs more per foot than natural fiber ropes and therefore is stronger.

2724. One characteristic of nylon rope is that it

1—is bulky.
2—does not stretch.
3—splinters easily.
4—is flexible.

2725. One means of vertical control on a gas balloon is

1—valving gas or releasing ballast.
2—opening and closing the appendix.
3—by using the rip panel rope.
4—valving air.

2726. To perform a normal descent in a gas balloon, it is necessary to

1—release ballast.
2—valve air.
3—open the appendix tie-off.
4—valve gas.

2727. What would cause a gas balloon to start a descent if a cold air mass is encountered and the envelope becomes cooled?

1—A density differential.
2—A barometric pressure differential.
3—The contraction of the gas.
4—The expansion of the gas.

2728. If a hot-air free balloon inadvertently descends into stratus clouds and is shielded from the sun, and if no corrections are made, one can expect to

1—descend more slowly.
2—descend more rapidly.
3—descend at an unchanged rate.
4—stop descending because of the upward vertical currents in the clouds.

2729. If powerlines become a factor during a balloon flight, a pilot should know that

1—less time is required to climb over obstacles in a strong wind.
2—contact with powerlines creates no great hazard for a balloon.
3—it is better to chance ripping at 25 feet above the ground than contacting the lines.
4—it is safer to contact the lines than chance ripping.

2730. If you are over a heavily-wooded area with no open fields in the vicinity and have only about 10 minutes of fuel remaining, you should

1—climb as high as possible to see where the nearest landing field is.
2—land in the trees while you have sufficient fuel for a controlled landing.
3—stay low and keep flying in hope that you will find an open field.
4—contact the ground crew and have them pull you out of the woods with a handling line.

2731. The windspeed is such that it is necessary to deflate the envelope as rapidly as possible during a landing. When should the deflation port (rip panel) be opened?

1—The instant the gondola contacts the surface.
2—As the balloon skips off the surface the first time and the last of the ballast has been discharged.
3—After ground contact has been firmly established and the envelope is swinging to the downward side of the gondola.
4—Prior to ground contact.

2732. It may be possible to make changes in the direction of flight in a hot-air balloon by

1—using the maneuvering vent.
2—operating at different flight altitudes.
3—flying a constant atmospheric pressure gradient.
4—operating above the friction level if there is no gradient wind.

2733. Which precaution should be exercised if confronted with the necessity of having to land when the air is turbulent?

1—Land in any available lake close to the upwind shore.
2—Throw propane equipment overboard immediately prior to touchdown.
3—Land in the trees to absorb shock forces, thus cushioning the landing.
4—Land in the center of the largest available field.

2734. When landing a free balloon, what should the occupants do to minimize landing shock?

1—Be seated on the floor of the basket.
2—Stand with knees slightly bent facing the direction of movement.
3—Stand back-to-back and hold onto the load ring.
4—Hold onto the handles attached to the load ring.

2735. On a balloon equipped with a blast valve, the blast valve is used for

1—climbs only.
2—control of altitude.
3—emergencies only.
4—valving off excess pressure in the tanks.

2736. What action is most appropriate when an envelope over-temperature condition occurs?

1—Throw all unnecessary equipment overboard.
2—Descend; hover in ground effect until the envelope cools.
3—Turn the main burner OFF.
4—Land as soon as practical.

2737. For what reason is methanol added to the propane fuel of hot-air balloons?

1—To check for fuel leaks.
2—As a fire retardent.
3—As an anti-icing additive.
4—To reduce the temperature.

2738. Why is it considered a good practice to blast the burner after changing fuel tanks?

1—To clear the fuel lines of cold propane.
2—It creates an immediate source of lift.
3—To ensure the new tank is functioning properly.
4—To check for fuel line leaks.

2739. The best way to determine burner BTU availability is the

1—color of the flame.
2—tank quantity.
3—fuel pressure gauge.
4—burner sound.

2740. Why should propane lines be bled after use?

1—Fire may result from spontaneous combustion.
2—The propane may expand and rupture the lines.
3—If the temperature is below freezing, the propane may freeze.
4—If the temperature is extremely hot, the next time the lines are used, vapor lock may occur.

2741. If you are flying at 1,000 feet MSL and drifting at a groundspeed of 18 MPH toward Waco-Madison Cooper Airport (Point B), at what approximate distance from the airport should you begin a 150 ft./min. ascent to climb above the airport traffic area? (See Figure 55.)

1—3 SM.
2—5 SM.
3—7 SM.
4—10 SM.

2742. What minimum altitude is required to avoid the Waco Airport Traffic area (Point B)? (See Figure 55.)

1—3,516 feet MSL.
2—3,516 feet AGL.
3—2,516 feet AGL.
4—2,516 feet MSL.

2743. What is the height of the top of the obstruction approximately 3 miles southwest of Clifton Airport (Point C)? (See Figure 55.)

1—219 feet AGL.
2—760 feet AGL.
3—986 feet AGL.
4—1,119 feet AGL.

2744. If you depart from Clifton Airport (Point C) at 0630 and at 0733 are over the town of Valley Mills, the wind direction and speed would be approximately (see Figure 55)

1—150 at 10 knots.
2—150 at 22 knots.
3—330 at 22 knots.
4—330 at 10 knots.

2745. What is the elevation of Clifton Airport (Point C)? (See Figure 55.)

1—30 feet.
2—750 feet.
3—760 feet.
4—1,119 feet.

2746. Select the true statement concerning a departure from Gatesville City-County Airport (Point A) with a northerly wind. (See Figure 55.)

1—You may not enter the restricted area unless advance permission has been obtained from the using agency or controlling agency, as appropriate.
2—There is no requirement to have special permission before entering the restricted area; however, pilots should exercise extreme caution.
3—You should stay below 1,700 feet MSL to avoid the restricted area.
4—You must climb to at least 3,000 feet MSL if you intend to enter the Hood Control Zone.

2747. If you depart from Gatesville Airport (Point A) and track a true course of 050 with a groundspeed of 12 knots, your position after 1 hour of flight would be over the (see Figure 55)

1—double obstructions on the northeast side of Gatesville.
2—town of Coryell.
3—town of Osage.
4—reformatory north of Gatesville.

2748. A free balloon flight through a restricted area is

1—permitted at certain times, but only with prior permission by the appropriate authority.
2—permitted anytime, but caution should be exercised because of high-speed military aircraft.
3—never permitted.
4—never permitted below 10,000 feet AGL.

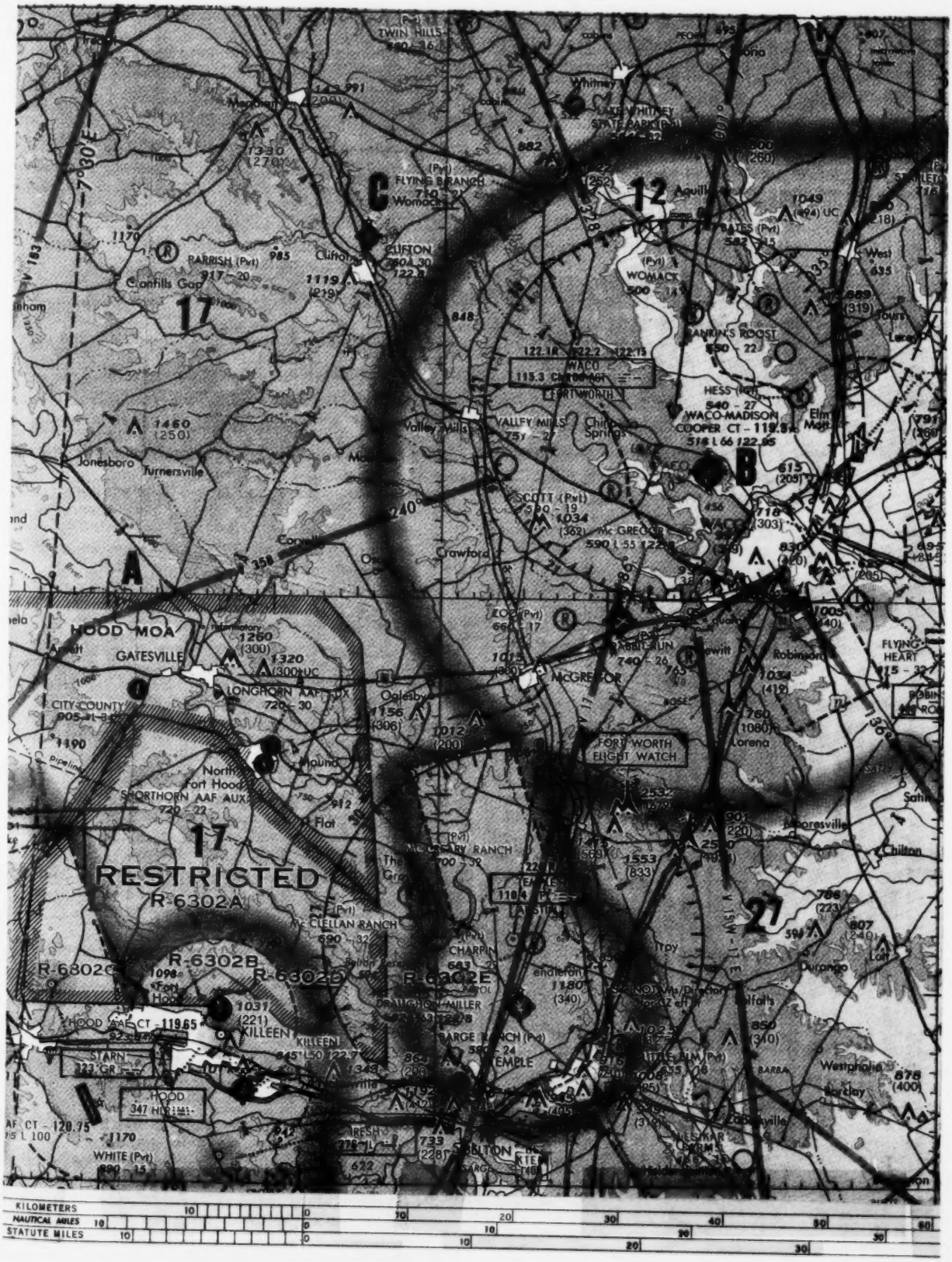

HOOD MOA
RESTRICTED
R-6302A
R-6302B
R-6302C
R-6302D
R-6302E
GATESVILLE
CLIFTON
WACO
WACO-MADISON
COOPER CT - 119.5
FORT WORTH
FLIGHT WATCH
McGREGOR
KILLEEN
TEMPLE
HOOD
347
WHITE (Pvt)
KILOMETERS
NAUTICAL MILES
STATUTE MILES

Figure 55

2749. What is the elevation of Flying V Airport (Point A)? (See Figure 56.)

1—2,200 feet.
2—1,500 feet.
3—700 feet.
4—680 feet.

2750. What would be an immediate hazard to be considered if departing from Flying V Airport (Point A) with a wind from the south? (See Figure 56.)

1—The balloon would drift toward the Dallas – Ft. Worth TCA.
2—The powerline which runs north and south.
3—The interstate highway just east of the airport.
4—The 680-foot obstruction on the airport.

2751. If you depart Sycamore Airport (Point B) with a southerly wind, what altitude restriction must you observe to avoid the TCA? (See Figure 56.)

1—Maintain an altitude between 5,000 and 8,000 feet MSL.
2—Maintain any altitude at or above 3,000 feet AGL.
3—Any altitude below 1,900 feet MSL, which is the floor of the TCA.
4—Remain below 5,000 feet MSL or above 8,000 feet MSL.

2752. A balloon departs Sycamore Airport (Point B) and drifts for a period of 1 hour in a wind of 270° at 18 knots. What MEF (Maximum Elevation Figure) would assure obstacle clearance during the next hour of flight? (See Figure 56.)

1—1,300 feet MSL.
2—1,500 feet MSL.
3—1,900 feet MSL.
4—2,500 feet MSL.

2753. What is the elevation of the obstruction 3 miles northwest of Sycamore Airport (Point B)? (See Figure 56.)

1—420 feet MSL.
2—1,235 feet MSL.
3—1,235 feet AGL.
4—760 feet MSL.

2754. If you depart Aero Country Airport (Point C) and track a true course of 090° with a groundspeed of 10 knots, what would be your position after 36 minutes of flight? (See Figure 56.)

1—Over the powerlines which cross the northern end of the lake.
2—Directly over the town of McKinney.
3—Over the town of Allen.
4—Half the distance between Aero Country Airport and the town of McKinney.

2755. If you depart Aero Country Airport (Point C) at 0900 and at 0927 your position is over the town of Celina, the windspeed is approximately (see Figure 56)

1—8 knots.
2—10 knots.
3—14 knots.
4—16 knots.

2756. Critical factors affecting the flight characteristics and controllability of an airship are

1—gross weight of the aircraft and fuel management.
2—temperature and atmospheric density.
3—airspeed and power.
4—static and dynamic trim.

2757. Before beginning any flight under IFR, the pilot in command must become familiar with all available information concerning that flight. In addition, the pilot must

1—list an alternate airport on the flight plan and become familiar with the instrument approaches to that airport.
2—list an alternate airport on the flight plan and confirm adequate takeoff and landing performance at the destination airport.
3—be familiar with all instrument approaches at the destination airport.
4—be familiar with the runway lengths at airports of intended use, and the alternatives available if the flight cannot be completed.

2758. If weather conditions are such that it is required to designate an alternate airport on your IFR flight plan, you should plan to carry enough fuel to arrive at the first airport of intended landing, fly from that airport to the alternate airport, and fly thereafter for

1—45 minutes at normal cruising speed.
2—30 minutes at slow cruising speed.
3—1 hour at normal cruising speed.
4—30 minutes at normal cruising speed.

2759. The purpose of a ground weigh-off is to determine the

1—useful lift of the airship.
2—static condition of the airship and the condition of trim.
3—amount of fuel that will be required to complete the flight as planned.
4—gross weight of the airship.

2760. Which takeoff procedure is considered to be most hazardous?

1—Maintaining only 50 percent of the maximum permissible positive angle of inclination.
2—Failing to apply full engine power properly on all takeoffs, regardless of wind.
3—Maintaining a negative angle of inclination during takeoff after elevator response is adequate for controllability.
4—Maintaining a light tailwheel contact when taking off in a light wind with a heavy airship.

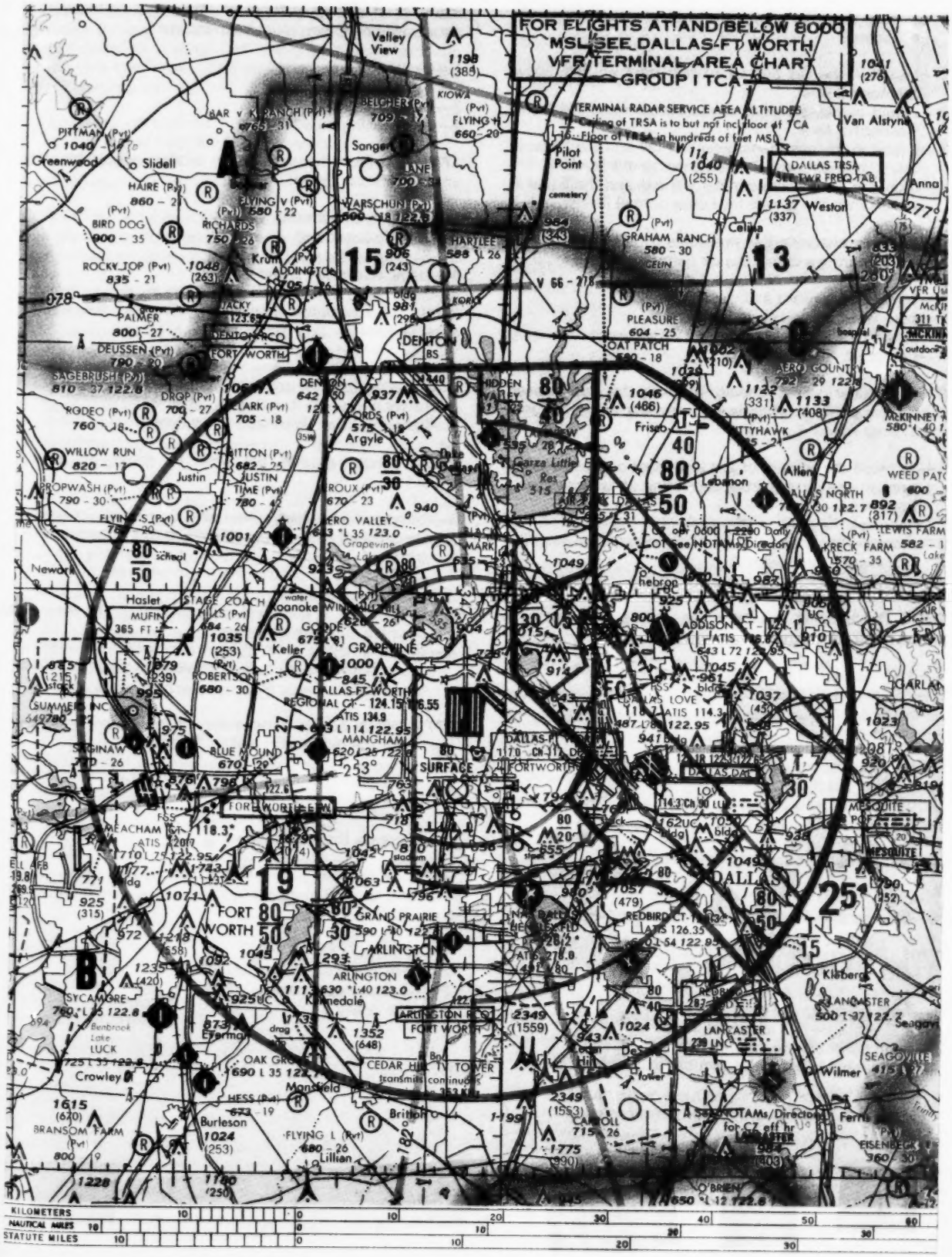

FOR FLIGHTS AT AND BELOW 8000 MSL SEE DALLAS-FT WORTH VFR TERMINAL AREA CHART GROUP I TCA
TERMINAL RADAR SERVICE AREA ALTITUDES
Ceiling of TRSA is to but not incl floor of TCA
Floor of TRSA in hundreds of feet MSL
DALLAS TRSA SEE TWR FREQ TAB
DALLAS-FT WORTH REGIONAL
DALLAS LOVE
DALLAS NORTH
FORT WORTH MEACHAM
ARLINGTON MUNI
ARLINGTON
FORT WORTH
GRAND PRAIRIE
DENTON
McKINNEY
Frisco
Lebanon
Allen
Addison
Mesquite
Lancaster
Seagoville
Wilmer
Waxahachie
Cedar Hill TV Tower
Valley View
Sanger
Pilot Point
Van Alstyne
Weston
Celina
Anna
Slidell
Greenwood
Krum
Argyle
Justin
Haslet
Keller
Grapevine
Newark
Sycamore
Crowley
Mansfield
Burleson
Lillian
Britton
Kennedale
Benbrook Lake
Eagle Mtn Lake
Lake Dallas
Lake Lewisville
Lake Ray Hubbard
Lake Grapevine
Lake Arlington
Lake Joe Pool
Kilometers
Nautical Miles
Statute Miles

Figure 56

2761. How does the pilot know when pressure height has been reached?

1—Liquid in the gas and air manometers will rise above the normal level.
2—Liquid in the gas and air manometers will fall below the normal level.
3—Liquid in the gas manometer will fall and the liquid in the air manometer will rise above normal levels.
4—Liquid in the gas manometer will rise and the liquid in the air manometer will fall below normal levels.

2762. When checking gas pressures (pressure height) of an airship during a climb, the air damper valves should

1—be opened forward and closed aft.
2—be opened aft and closed forward.
3—be opened.
4—be closed.

2763. Damper valves should normally be kept closed during the climb to altitude because any air forced into the system would

1—increase the amount of gas that must be exhausted to prevent the airship from ascending at an excessively high rate.
2—decrease the purity of the gas within the envelope.
3—increase the amount of air to be exhausted, resulting in a lower rate of ascent.
4—decrease the volume of gas within the envelope.

2764. The ballonet volume of an airship envelope with respect to the total gas volume is approximately

1—15 percent.
2—25 percent.
3—30 percent.
4—35 percent.

2765. When operating an airship with the ballonet air valve in the automatic forward position, the aft valve locks should not be engaged with either after-damper open because

1—helium will be released overboard.
2—the aircraft will enter an excessive stern-high attitude.
3—ballonet over-inflation and rupture may occur.
4—the aircraft will enter an excessive bow-high attitude.

2766. The pressure height with any airship is that height at which

1—both ballonets are empty.
2—gas pressure is 3 inches of water.
3—both ballonets are inflated.
4—the airship is unable to gain more altitude.

2767. If an airship in flight is either light or heavy, the unbalanced condition must be overcome

1—by valving air.
2—by valving gas.
3—aerodynamically.
4—by releasing ballast.

2768. Maximum headway in an airship is possible only under which condition?

1—Flying in equilibrium.
2—Slightly nosedown.
3—Slightly tail down.
4—Using maximum power.

2769. To accomplish maximum headway, the airship must be kept

1—at equilibrium.
2—heavy by the bow and light by the stern.
3—heavy and flown dynamically positive.
4—light and flown dynamically negative.

2770. If both engines fail while en route, an airship should be

1—trimmed nose-heavy to use the airship's negative dynamic lift to fly the airship down to the landing site.
2—trimmed nose-light to use the airship's positive dynamic lift to control the angle and rate of descent to the landing site.
3—brought to a condition of equilibrium as soon as possible and free-ballooned.
4—flown dynamically negative or positive (as required) to touch down and all fuel and ballast dumped to lessen the impact.

2771. Which action is necessary in order to perform a normal descent in an airship?

1—Valve gas.
2—Valve air.
3—Take air into the aft ballonets.
4—Decrease the engine power.

2772. To land an airship that is 250 pounds heavy when the wind is calm, the best landing can usually be made if the airship is

1—in trim.
2—nose heavy approximately 20°.
3—tail heavy approximately 20°.
4—nose heavy 5°.

2773. A heavy airship flying dynamically with air ballasted forward to overcome a climbing tendency and slowed down for a weigh-off in the air prior to landing will be very bow heavy. This condition must be corrected prior to landing by

1—ballasting air forward.
2—dumping fuel from the forward tanks.
3—ballasting air aft.
4—discharging forward ballast.

2774. If an airship should experience failure of both engines during flight and neither engine can be restarted, what initial immediate action must the pilot take?

1—The airship must be driven down to a landing before control and envelope shape are lost.
2—The emergency auxiliary power unit must be started for electrical power to the airscoop blowers so that ballonet inflation can be maintained.
3—Immediate preparations to operate the airship as a free balloon are necessary.
4—Valve large quantities of helium so that an immediate descent to an emergency landing can be accomplished.

2775. You are flying an airship under an IFR flight plan and experience two-way communications radio failure while in VFR conditions. In this situation, you should continue your flight under

1—IFR and maintain the last assigned route and altitude to your flight plan destination.
2—VFR and land as soon as practicable.
3—IFR and follow the route and maintain the altitude requested on your flight plan.
4—VFR and proceed to your flight plan destination.

2776. GIVEN:

Magnetic heading.....247°
Relative bearing to NDB B
(fixed dial ADF).....307°

Determine the magnetic bearing to NDB B.

1—007°.
2—014°.
3—187°.
4—194°.

2777. GIVEN:

Magnetic heading.....327°
Relative bearing to NDB B
(fixed dial ADF).....295°

Determine the magnetic bearing to NDB B.

1—082°.
2—090°.
3—262°.
4—270°.

2778. GIVEN:

Magnetic heading.....052°
Relative bearing to NDB B
(fixed dial ADF).....265°

Determine the magnetic bearing from NDB B.

1—137°.
2—147°.
3—317°.
4—325°.

2779. GIVEN:

Magnetic heading.....317°
Relative bearing to NDB B
(fixed dial ADF).....215°

Determine the magnetic bearing from NDB B.

1—165°.
2—172°.
3—345°.
4—352°.

2780. GIVEN:

Time between bearings.....6 min.
Bearing change.....10°
Rate of fuel consumption.....16 gal./hr.

Calculate the approximate fuel required to fly to station.

1—8.8 gal.
2—9.6 gal.
3—10.4 gal.
4—12.1 gal.

2781. Flight service stations in the conterminous 48 United States having voice capability on VOR's or radiobeacons (NDB's) broadcast

1—hourly weather reports at 15 minutes past each hour from reporting points within 150 NM of the broadcast stations.
2—hourly weather reports at 15 and 45 minutes past each hour for those reporting stations within approximately 150 NM of the broadcast stations.
3—AIRMET's and SIGMET's at 15 minutes past the hour and each 15 minutes thereafter as long as they are in effect.
4—AIRMET's and Non-convective SIGMET's at 15 minutes and 45 minutes past the hour for the first hour after issuance.

2782. To obtain a continuous transcribed weather briefing including winds aloft and route forecasts for a cross-country flight, a pilot could monitor

1—a TWEB on a low-frequency radio receiver.
2—a VHF radic receiver tuned to an ATIS frequency.
3—the regularly scheduled weather broadcast on a VOR frequency.
4—a high-frequency radio receiver tuned to En Route Flight Advisory Service.

2783. TWEB's (transcribed weather broadcasts) may be monitored by tuning the appropriate radio receiver to certain

1—FSS communications frequencies.
2—airport advisory frequencies.
3—VOR and NDB frequencies.
4—NDB frequencies only.

2784. Moisture is added to a parcel of air by

1—sublimation and heating.
2—supersaturation and evaporation.
3—heating and condensation.
4—evaporation and sublimation.

2785. Every physical process of weather is accompanied by, or is the result of,

1—the movement of air.
2—a pressure differential.
3—a heat exchange.
4—moisture.

2786. Temperature in aviation weather is expressed in either Fahrenheit or Centigrade (Celsius). On which type of report is each used?

1—Fahrenheit on hourly aviation observations, and Centigrade on special observations.
2—Fahrenheit on all weather reports, and Centigrade on all forecasts.
3—Fahrenheit on all surface observations, and Centigrade on all temperatures aloft.
4—Fahrenheit on all general aviation weather reports, and Centigrade on all military and airline reports.

2787. Which is true regarding actual air temperature and dew point temperature spread?

1—The temperature spread decreases as the relative humidity decreases.
2—The temperature spread decreases as the relative humidity increases.
3—The temperature spread increases as the relative humidity increases.
4—Temperature and dew point spread are not related to relative humidity.

2788. The most current en route and destination flight information for an instrument flight should be obtained from

1—the ATIS broadcast.
2—the FSS.
3—ARTCC.
4—Notices to Airmen (class 2).

2789. What is a characteristic of stable air?

1—Stratiform clouds.
2—Unlimited visibility.
3—Fair weather cumulus clouds.
4—Temperature decreases rapidly with altitude.

2790. What are the characteristics of stable air?

1—Good visibility; showery precipitation; cumulus clouds.
2—Good visibility; steady precipitation; stratus clouds.
3—Poor visibility; intermittent precipitation; cumulus clouds.
4—Poor visibility; steady precipitation; stratus clouds.

2791. Which would decrease the stability of an air mass?

1—Warming from below.
2—Cooling from below.
3—Decrease in water vapor.
4—Sinking of the air mass.

2792. From which measurement of the atmosphere can stability be determined?

1—Surface temperature.
2—The dry adiabatic lapse rate.
3—The ambient lapse rate.
4—Atmospheric pressure.

2793. Why does the wind have a tendency to follow the isobars above the friction level?

1—Isobars are lines connecting points of equal wind direction aloft.
2—The Coriolis force tends to counterbalance the horizontal pressure gradient.
3—The Coriolis force acts perpendicular to a line connecting the highs and lows.
4—The friction of the air with the Earth deflects the air perpendicular to the pressure gradient.

2794. Which feature is associated with the tropopause?

1—Absence of wind and turbulent conditions.
2—Absolute upper limit of cloud formation.
3—Abrupt change in temperature lapse rate.
4—Constant height above the Earth.

2795. What determines the structure or type of clouds which will form as a result of air being forced to ascend?

1—The amount of condensation nuclei present after lifting occurs.
2—The method by which the air is lifted.
3—The relative humidity of the air after lifting occurs.
4—The stability of the air before lifting occurs.

2796. What type of clouds will be formed if very stable, moist air is forced upslope?

1—First, stratified clouds and then vertical clouds.
2—First, vertical clouds and then stratified clouds.
3—Vertical clouds with increasing height.
4—Stratified clouds with little vertical development.

2797. The presence of standing lenticular altocumulus clouds is a good indication of

1—heavy rain.
2—very strong turbulence.
3—heavy icing conditions.
4—an approaching storm.

2798. Which cloud types would indicate convective turbulence?

1—Altocumulus standing lenticular clouds.
2—Nimbostratus clouds.
3—Towering cumulus clouds.
4—Cirrus clouds.

2799. Which combination of weather-producing variables would likely result in cumuliform-type clouds, good visibility, showery rain, and possible clear icing in clouds?

1—Stable, moist air and orographic lifting.
2—Unstable, moist air and no lifting mechanism.
3—Stable, dry air and orographic lifting.
4—Unstable, moist air and orographic lifting.

2800. Which are characteristics of a cold air mass moving over a warm surface?

1—Cumuliform clouds, turbulence, and poor visibility.
2—Cumuliform clouds, turbulence, and good visibility.
3—Stratiform clouds, smooth air, and poor visibility.
4—Stratiform clouds, turbulence, and good visibility.

2801. In aviation weather reports, cloud bases are reported as height above

1—the surface at the station of observation.
2—mean sea level at the station of observation.
3—the pressure altitude of the station at the time of the observation.
4—the highest terrain within a radius of 5 miles of the observation station.

2802. The remarks section of the hourly aviation weather report contains the following coded information:

RADAT 92050

What is the meaning of this information?

1—A pilot reported thunderstorms at a distance of 92 DME miles on the 050 radial of the VORTAC.
2—Relative humidity was 92 percent and the freezing level (0° C) was at 5,000 feet MSL.
3—Radar echoes with tops at 5,000 feet were observed on the 092 radial of the VORTAC.
4—Radar echoes were observed at a distance of 92 miles on a bearing of 050°.

2803. Refer to the excerpt from a surface weather report:

ABC ...194/89/45/2115/993...

At approximately what altitude AGL should bases of convective-type cumuliform clouds be expected? (Use most accurate method.)

1—4,400 feet.
2—8,900 feet.
3—10,000 feet.
4—11,000 feet.

2804. Refer to the excerpt from a surface weather report:

DEF ...172/86/72/3010/994...

At approximately what altitude AGL should bases of convective-type cumuliform clouds be expected? (Use most accurate method.)

1—5,500 feet.
2—6,200 feet.
3—7,500 feet.
4—8,300 feet.

2805. What is the term used to describe streamers of precipitation trailing beneath clouds but evaporating before reaching the ground?

1—COL.
2—Dissipation trails.
3—Virga.
4—Foehn.

2806. What term is used to classify a sudden increase in windspeed of at least 15 knots to a sustained speed of 20 knots or more for at least 1 minute duration?

1—Gust.
2—Squall.
3—Katabatic wind.
4—COL wind.

2807. SIGMET's are issued as a warning of weather conditions hazardous

1—to all aircraft.
2—particularly to light airplanes.
3—to VFR operations only.
4—particularly to heavy aircraft.

2808. Interpret the following radar weather report:

LZK 1133 AREA 4TRW+/+ 22/100 88/170 196/180 220/115 C2425 MT 310 AT 162/110

Which is true concerning the report?

1—The area contains four large thunderstorms and the intensity of the thunderstorms is intense.
2—The cells are moving in a direction of 162° at 11 knots.
3—The maximum top of the cells is located at 162° and 110 NM from the station (LZK).
4—There are four cells with tops at 10,000 feet, 17,000 feet, 18,000 feet, and 11,500 feet, respectively.

2809. Which is true concerning this radar weather report for OKC?

OKC 1934 LN 8TRW+ + /+ 86/40 164/60 199/115
15W 2425 MT 570 AT 159/65 2 INCH HAIL
RPRTD THIS ECHO.

1—The visibility is 8 miles in rain showers.
2—The line of cells is moving 080° with winds reported up to 40 knots.
3—There are three cells with tops at 11,500, 40,000, and 60,000 feet.
4—The maximum top of the cells is 57,000 feet located 65 NM south-southeast of the station.

2810. Which is true concerning this radar weather report for JAN?

JAN 1935 SPL LN 10TRWX/NC 86/40164/60 199/115
12W C2430 MT 440 AT 159/65 D10.

1—The visibility is 10 miles in intense rain showers.
2—The line of cells is moving from 159° with winds reported up to 65 knots.
3—There are three cells with tops at 11,500, 40,000, and 60,000 feet.
4—The maximum tops are 44,000 feet located 65 NM southeast of the station.

2811. On a surface analysis chart, the solid lines that depict pressure patterns are called

1—isotachs.
2—isobars.
3—isodrosotherms.
4—isotherms.

2812. Dashed lines on a surface analysis chart, if depicted, indicate that the pressure gradient is

1—stable.
2—unstable.
3—weak.
4—strong.

2813. The charts that provide a ready means of locating observed frontal positions and pressure centers are the

1—weather depiction and pressure analysis.
2—weather depiction and constant pressure analysis.
3—weather depiction and surface analysis.
4—surface analysis and constant pressure.

2814. On a surface analysis chart, close spacing of the isobars indicate

1—strong pressure gradient.
2—strong temperature gradient.
3—weak temperature gradient.
4—weak pressure gradient.

2815. When total sky cover is few or scattered, the height shown on the weather depiction chart is the

1—base of the lowest layer.
2—base of the highest layer.
3—average of all observed layers.
4—top of the lowest layer.

2816. What single reference contains information regarding frontal movement, turbulence, and icing conditions for a specific area?

1—500 MB Prognostic Chart.
2—Weather Depiction Chart.
3—Area Forecast.
4—Terminal Forecast.

2817. For a brief summary of the location and movement of fronts, pressure systems, and circulation patterns, the pilot should refer to the

1—Terminal Forecast.
2—Radar Summary Chart.
3—Stability Chart.
4—Area Forecast.

2818. For a brief summary of the location and movement of fronts and pressure systems, a pilot should refer to the

1—Radar Summary Chart.
2—Terminal Forecast.
3—Area Forecast Synopsis.
4—Stability Chart.

2819. The single source reference providing the pilot with information regarding turbulence, icing conditions, and frontal movement is the

1—Terminal Forecast.
2—750 MB Prognostic Chart.
3—Weather Depiction Chart.
4—Area Forecast.

2820. The National Weather Service prepares FA's for the contiguous United States

1—twice each day.
2—three times each day.
3—four times each day.
4—every 6 hours unless significant changes in weather require more often.

2821. Terminal Forecasts are issued how many times a day and cover what period of time?

1—Three times daily and are valid for 24 hours including a 6-hour categorical outlook.
2—Four times daily and are valid for 18 hours including a 4-hour categorical outlook.
3—Six times daily and are valid for 12 hours with an additional 6-hour categorical outlook.
4—Two times daily and are valid for 24 hours with an additional 4-hour categorical outlook.

2822. The body of a Terminal Forecast relates to flight operations within

1—a 5-mile radius of the center of a runway complex.
2—10 miles of the station originating the forecast.
3—25 miles of the center of an airport.
4—a 10-mile radius of the center of the airport.

2823. What is the meaning of the term MVFR, as used in the categorical outlook portion of Terminal and Area Forecasts?

1—A ceiling of 1,000 to 3,000 feet, and/or visibility of 3 to 5 miles.
2—A ceiling less than 1,000 feet, and/or visibility less than 3 miles.
3—A ceiling of 3,000 to 5,000 feet, and visibility of 5 to 7 miles.
4—A ceiling less than 1,000 feet, and/or visibility less than 1 mile.

2824. The contraction WND in the 6-hour categorical outlook in the Terminal Forecast means that the wind during that period is forecast to be

1—10 to 15 knots.
2—15 to 20 knots.
3—less than 25 knots.
4—25 knots or stronger.

2825. Which statement pertaining to a Terminal Forecast is true?

1—The term VFR CIGS ABV 100 in the categorical outlook implies ceilings above 10,000 feet and visibility more than 5 miles.
2—The term CHC TRW VCNTY in the remarks section pertains to an area within a 5-mile radius of the airport.
3—The term WND in the categorical outlook implies surface winds are forecast to be 10 knots or greater.
4—The absence of visibility in the first 18-hour period means surface visibility is forecast to be more than 7 miles.

2826. The absence of a visibility entry in a Terminal Forecast specifically implies that the surface visibility is expected to be more than

1—15 miles.
2—10 miles.
3—6 miles.
4—3 miles.

2827. What is indicated by the terms "FLT PRCTNS...IFR...TX AR LA MS TN AL AND CSTL WTRS" contained in the hazards and flight precautions section of the Area Forecast?

1—IFR conditions, turbulence, and icing are all forecast within the valid period for the listed states.
2—IFR conditions which meet inflight advisory criteria are forecast for the states listed.
3—Thunderstorms are forecast in those states listed within the FA boundary.
4—Each state and geographic area listed is reporting ceilings and visibilities below VFR minimums.

2828. What is indicated by the terms "CIGS GENLY BLO 10" in the clouds and weather section of an Area Forecast?

1—Clouds are generally below 10,000 feet MSL.
2—Ceilings are generally below 10,000 feet AGL.
3—Ceilings are generally below 1,000 feet MSL.
4—Ceilings are generally below 1,000 feet AGL.

2829. Which section of the Area Forecast contains a description of IFR conditions and mountain obscurations that are forecast to affect the FA area, as well as the location of the affected areas?

1—The hazards and flight precautions section.
2—The synopsis section.
3—The icing section.
4—The significant cloud and weather section.

2830. In the Area Forecast, what method is used to describe the location of each icing phenomenon?

1—Prominent landmarks and major airports, as well as state boundaries, are used to outline each affected area.
2—VOR points outline the affected area(s) within the designated FA boundary, but not beyond the FA boundary.
3—State names and portions of states, such as northwest and south central, are used to outline each affected area.
4—VOR points are used to outline the area of icing, including VOR points outside the designated FA boundary, if necessary.

2831. What information is contained in the significant cloud and weather section of the Area Forecast?

1—Cloud layers if they are classified broken or overcast with bases below 1,000 feet AGL, and visibility and obstructions to vision only if visibilities are forecast to be less than 3 miles.
2—Cloud bases and tops, layers, surface visibility and obstructions to vision if forecast visibility is 5 miles or less, precipitation, thunderstorms, and sustained winds of 30 knots or greater.
3—Only cloud bases and tops, layers, and those obstructions to vision that are considered significant to flight operations.
4—A summary of all reported weather conditions, including pilot weather reports and a summary of weather radar reports.

2832. Which information is contained in the HAZARDS section of the Area Forecast?

1—A brief list of weather phenomena that meet AIRMET and/or SIGMET criteria and the location of each.
2—A summary of general weather conditions for the entire region covered in the Area Forecast.
3—A brief summary of significant weather and clouds that do not meet AIRMET and/or SIGMET criteria.
4—Only a list of those AIRMETS in effect at the time of the scheduled FA.

2833. The section of the Area Forecast entitled SGFNT CLOUD AND WX contains a

1—summary of AIRMETS and SIGMETS still in effect at the time of issue.
2—summary of forecast sky cover, cloud tops, visibility, and obstructions to vision along specific routes.
3—summary of only those weather systems producing liquid or frozen precipitation, fog, thunderstorms, or IFR ceilings.
4—summary of sky condition, cloud heights, visibility, weather and/or obstructions to visibility, and surface winds of 30 knots or more.

2834. In Area Forecasts, cloud heights are given in reference to

1—pressure altitude.
2—density altitude.
3—MSL unless noted otherwise.
4—ground level only.

2835. Hatching on a constant pressure prognostic chart indicates

1—severe thunderstorms.
2—hurricane eye.
3—windspeed 70 knots to 110 knots.
4—windspeed 110 knots to 150 knots.

2836. What is the upper limit of the Low Level Significant Weather Prognostic Chart?

1—30,000 feet.
2—24,000 feet.
3—18,000 feet.
4—14,000 feet.

2837. The 12-hour Surface Prognostic Chart indicates that West Virginia will likely experience (see Figure 57)

1—scattered showers and thunderstorms covering less than half the area.
2—continuous or showery precipitation covering half or more of the area.
3—thunderstorms and rain showers covering half or more of the area.
4—continuous rain covering less than half the area.

2838. A planned low-altitude flight from central Oklahoma to western Tennessee at 1200Z is likely to encounter (see Figure 57)

1—continuous or intermittent rain or rain showers, moderate turbulence, and freezing temperatures below 8,000 feet.
2—continuous rain with little change in precipitation intensity, severe turbulence, and freezing temperatures lower to the east.
3—continuous or showery rain over half or more of the area, moderate turbulence, and freezing temperatures above 10,000 feet.
4—showery precipitation covering less than half the area, no turbulence below 18,000 feet, and freezing temperatures above 12,000 feet.

2839. What weather conditions are indicated on the 24-hour Prognostic Chart for a planned flight from central Iowa to the Louisiana Gulf Coast? (See Figure 57.)

1—Moderate turbulence above 18,000 feet over Arkansas, ceilings above 3,000 feet across Missouri and Arkansas, clear skies over most of Louisiana.
2—Cloud tops above 24,000 feet along the entire route, continuous rain covering less than half of the area north of the front, turbulence below 10,000 feet over all of Louisiana.
3—Clear skies above 18,000 feet, continuous rain showers north of the stationary front, IFR ceilings and visibilities across most of Louisiana.
4—Moderate turbulence from the surface to 18,000 feet across southern Missouri and most of Arkansas, showery precipitation covering half or more of the area north of the front, possible thunderstorms over Louisiana.

2840. What weather phenomenon is implied within an area enclosed by small scalloped lines on a HI LVL SIG WX PROG Chart?

1—Cumuliform or standing lenticular clouds, moderate to severe turbulence, and icing.
2—Cumulonimbus clouds, icing, and moderate or greater turbulence.
3—Cirriform clouds, light to moderate turbulence, and icing.
4—Cirrocumulus clouds, moderate turbulence; no icing unless specifically indicated.

2841. Large scalloped lines shown on a HI LVL SIG WX PROG Chart enclose areas of

1—existing stratus clouds.
2—forecast dense, continuous cirriform clouds.
3—existing cirriform clouds of scattered to broken coverage.
4—forecast cumulus clouds.

2842. The High Level Significant Weather Prognostic Chart forecasts significant weather for what airspace?

1—18,000 feet to 63,000 feet.
2—24,000 feet to 45,000 feet.
3—18,000 feet to 45,000 feet.
4—24,000 feet to 63,000 feet.

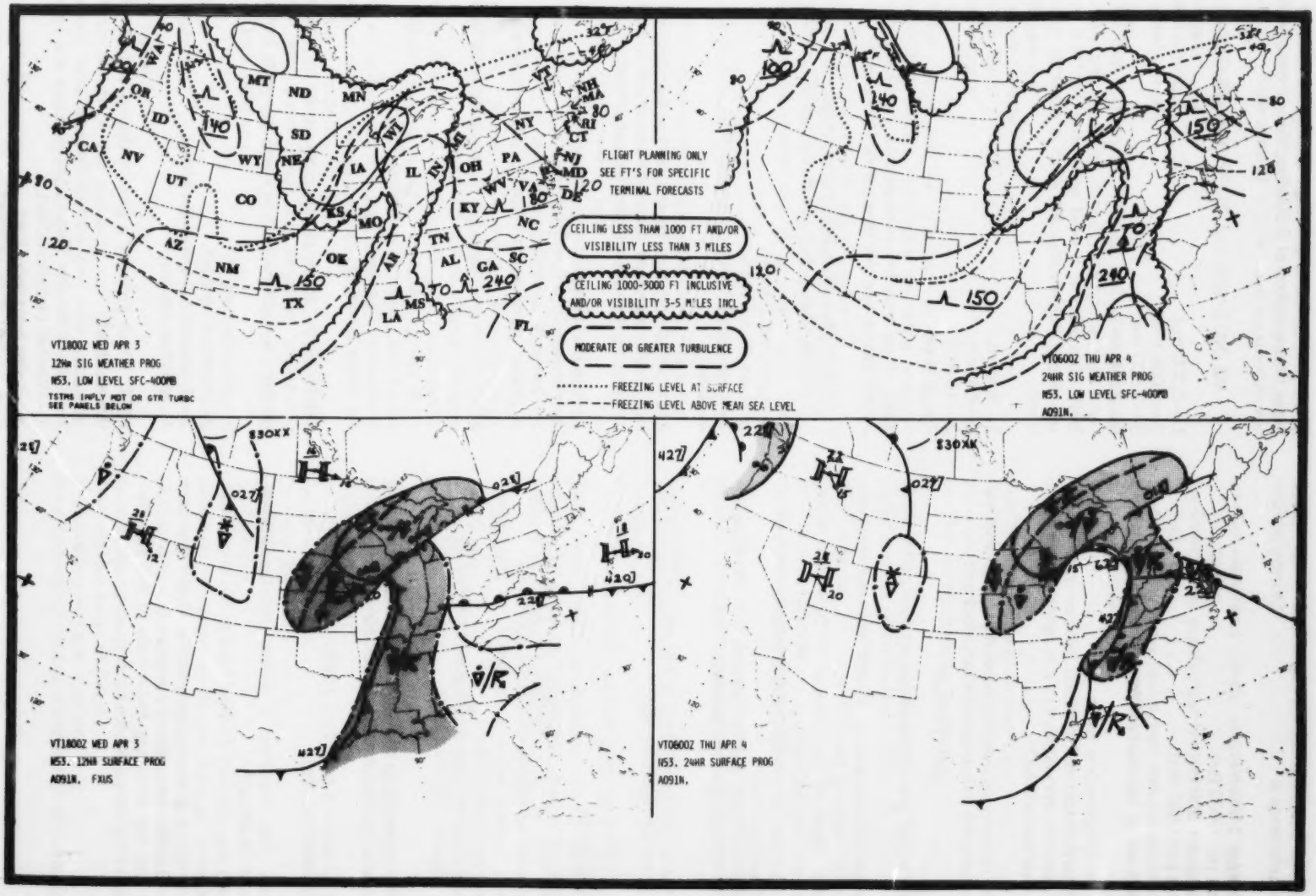

FLIGHT PLANNING ONLY
SEE FT'S FOR SPECIFIC
TERMINAL FORECASTS
CEILING LESS THAN 1000 FT AND/OR
VISIBILITY LESS THAN 3 MILES
CEILING 1000-3000 FT INCLUSIVE
AND/OR VISIBILITY 3-5 MILES INCL
MODERATE OR GREATER TURBULENCE
FREEZING LEVEL AT SURFACE
FREEZING LEVEL ABOVE MEAN SEA LEVEL
VT1800Z WED APR 3
12Hr SIG WEATHER PROG
N53, LOW LEVEL SFC-400PB
TSTMS IMPLY MDT OR GTR TURBC
SEE PANELS BELOW
VT0600Z THU APR 4
24HR SIG WEATHER PROG
N53, LOW LEVEL SFC-400PB
A091N.
VT1800Z WED APR 3
N53, 12HR SURFACE PROG
A091N, FXUS
VT0600Z THU APR 4
N53, 24HR SURFACE PROG
A091N.

Figure 57

2843. The vertical wind shear value critical for probable moderate turbulence is

1—4 knots per 1,000 feet.
2—5 knots per 1,000 feet.
3—6 knots per 1,000 feet.
4—7 knots per 1,000 feet.

2844. What values are used for Winds Aloft Forecasts?

1—Magnetic direction and knots.
2—Magnetic direction and MPH.
3—True direction and knots.
4—True direction and MPH.

2845. The remarks section of the hourly aviation weather report contains the following coded information:

RADAT 87045

What is the meaning of this information?

1—Radar echoes with tops at 45,000 feet were observed on the 087 radial of the VORTAC.
2—A pilot reported thunderstorms 87 DME miles distance on the 045 radial of the VORTAC.
3—Radar echoes were observed at a distance of 87 miles on a bearing of 045°.
4—Relative humidity was 87 percent and the freezing level (0° C) was at 4,500 feet MSL.

2846. What is the significance of the entry RB35 in the remarks of the SA report for MLC?

MLC SA 1352 8 SCT E18 OVC 7R 123/64/62/
3307/992 RB35

1—Cloud tops of rain showers at 3,500 feet AGL determined by radiosonde balloon soundings.
2—Runway braking factor is 35 percent of dry runway surface due to light rain.
3—Runway arresting gear is inoperative on Rwy 35.
4—Rain began at 1335Z at MLC.

2847. What is meant by the entry in the remarks section of this Surface Aviation Weather Report for BOI?

BOI SP 1854 -X M7 OVC 1 1/2R+F 990/63/61/
3205/980/RF2 RB12

1—Runway fog, visibility 2 miles; runway braking reduced 12 percent.
2—Runway fog, visibility 2 miles; base of the rain clouds 1,200 feet.
3—Rain and fog obscuring two-tenths of the sky; rain began 12 minutes before the hour.
4—Rain and fog obscuring two-tenths of the sky; rain began 12 minutes after the hour.

2848. The station originating the following weather report has a field elevation of 3,500 feet MSL. If the sky cover is one continuous layer, what is its thickness?

M5 OVC 1/2HK 173/73/72/0000/002/OVC 75

1—7,000 feet.
2—4,000 feet.
3—3,500 feet.
4—2,500 feet.

2849. Omission of a wind entry in a Terminal Forecast specifically implies that the wind is expected to be less than

1—5 knots.
2—6 knots.
3—10 knots.
4—12 knots.

2850. What expected windspeed is specifically implied at 2200Z by this terminal forecast for Memphis?

MEM 251010 C5 X 1/2F 1710 OCNL CO X 1/2F.
16Z C25 BKN 1 1/2F 1720. 22Z 20 SCT. 000Z CLR.

1—Less than 3 knots.
2—Less than 5 knots.
3—Less than 10 knots.
4—Calm.

2851. Which primary source should be used to obtain information regarding the weather expected to exist at the destination at your estimated time of arrival?

1—Low Level Prog Chart.
2—Weather Depiction Chart.
3—Terminal Forecast.
4—Radar Summary and Weather Depiction Chart.

2852. Which weather chart depicts conditions forecast to exist at a specific time in the future?

1—Freezing Level.
2—12-Hour Significant Weather Prog.
3—Weather Depiction.
4—Radar Summary.

2853. Which forecast provides specific information concerning expected sky cover, cloud tops, visibility, weather, and obstructions to vision in a route format?

1—Area Forecast.
2—Terminal Forecast.
3—Transcribed Weather Broadcast.
4—Weather Advisory.

2854. Which provides a graphic display of both VFR and IFR weather?

1—Surface Weather Map.
2—Weather Depiction Chart.
3—Radar Summary Chart.
4—Constant Pressure Chart.

2855. To best determine observed weather conditions between weather reporting stations, the pilot should refer to

1—weather maps.
2—pilot reports.
3—area forecasts.
4—prognostic charts.

2856. To best determine forecast weather conditions between weather reporting stations, the pilot should refer to

1—pilot reports.
2—prognostic charts.
3—weather maps.
4—area forecasts.

2857. What information is provided by the Radar Summary Chart that is not shown on other weather charts?

1—Lines and cells of hazardous thunderstorms.
2—Ceilings and precipitation between reporting stations.
3—Types of precipitation between reporting stations.
4—Areas of cloud cover and icing levels within the clouds.

2858. The Surface Analysis Chart depicts

1—actual pressure systems, frontal locations, cloud tops, and precipitation at the time shown on the chart.
2—frontal locations and expected movement, pressure centers, cloud coverage, and obstructions to vision at the time of chart transmission.
3—actual frontal positions, pressure patterns, temperature, dew point, wind, weather, and obstructions to vision at the valid time of the chart.
4—actual pressure distribution, frontal systems, cloud heights and coverage, temperature, dew point, and wind at the time shown on the chart.

2859. What flight planning information can a pilot derive from Constant Pressure Charts?

1—Clear air turbulence and icing conditions.
2—Levels of widespread cloud coverage.
3—Winds and temperatures aloft.
4—Frontal systems and obstructions to vision aloft.

2860. Which units are used on Constant Pressure Charts to depict height contours?

1—Meters.
2—Millibars.
3—Feet.
4—Flight levels.

2861. From which of the following can the observed temperature, wind, and temperature/dew point spread be determined at a specified altitude?

1—Winds Aloft Forecasts.
2—Significant Weather Prognostic Charts.
3—Constant Pressure Charts.
4—Stability Charts.

2862. What visible signs indicate extreme turbulence in thunderstorms?

1—Cumulonimbus clouds, very frequent lightning, and roll clouds.
2—Base of the clouds near the surface, heavy rain, and hail.
3—Low ceiling and visibility, hail, and precipitation static.
4—Lightning, roll clouds, low ceilings and visibility, and precipitation static.

2863. Which weather phenomenon signals the beginning of the mature stage of a thunderstorm?

1—The appearance of an anvil top.
2—The start of rain at the surface.
3—Growth rate of cloud is maximum.
4—Strong turbulence in the cloud.

2864. What feature is normally associated with the cumulus stage of a thunderstorm?

1—Roll cloud.
2—Continuous updraft.
3—Frequent lightning.
4—Beginning of rain at the surface.

2865. During the life cycle of a thunderstorm, which stage is characterized predominately by downdrafts?

1—Cumulus.
2—Dissipating.
3—Mature.
4—Anvil.

2866. What minimum distance should exist between intense radar echoes before any attempt is made to fly between these thunderstorms?

1—10 miles.
2—20 miles.
3—30 miles.
4—40 miles.

2867. If airborne radar is indicating an extremely intense thunderstorm echo, this echo should be avoided by a distance of at least

1—20 miles.
2—25 miles.
3—30 miles.
4—35 miles.

2868. When a climb or descent through an inversion or wind-shear zone is being performed, the pilot should be alert for which changes in airplane performance?

1—A sudden change in airspeed.
2—A sudden surge of thrust.
3—A sudden decrease in power.
4—A fast rate of climb and a slow rate of descent.

2869. During departure, under conditions of suspected low-level wind shear, a sudden decrease in headwind will cause

1—a gain in airspeed equal to the decrease in wind velocity.
2—a loss in airspeed equal to twice the amount of decrease in wind velocity.
3—a gain in airspeed equal to twice the amount of decrease in wind velocity.
4—a loss in airspeed equal to the decrease in wind velocity.

2870. During an approach, the most important and most easily recognized means of being alerted to possible wind shear is monitoring the

1—heading changes necessary to remain on the runway centerline.
2—increasing trend in the severity of turbulence as the aircraft approaches the surface.
3—amount of trim required to relieve control pressures.
4—power and vertical velocity required to remain on the proper glidepath.

2871. What is an important characteristic of wind shear?

1—It usually exists only in the vicinity of thunderstorms, but may be found near a strong temperature inversion.
2—It can be present at any level and can exist in both a horizontal and vertical direction.
3—It occurs primarily at the lower levels and is usually associated with mountain waves.
4—It exists in a horizontal direction only, and is normally found near a jet stream.

2872. Hazardous wind shear is commonly encountered

1—near thunderstorms, and during periods when the wind velocity is stronger than 35 knots.
2—during periods when the wind velocity is stronger than 35 knots, and near mountain valleys.
3—during periods of strong temperature inversion, and near thunderstorms.
4—near mountain valleys, and on the windward side of a hill or mountain.

2873. During the winter months in the middle latitudes, the jet stream shifts toward the

1—south and speed decreases.
2— north and speed decreases.
3—south and speed increases.
4—north and speed increases.

2874. The strength and location of the jet stream is normally

1—stronger and farther north in the winter.
2—weaker and farther north in the summer.
3—stronger and farther north in the summer.
4—weaker and farther south in the winter.

2875. A common location of clear air turbulence is

1—in an upper trough on the polar side of a jet stream.
2—near a ridge aloft on the equatorial side of a high-pressure flow.
3—downstream of the equatorial side of a jet stream.
4—south of an east/west oriented high-pressure ridge in its dissipating stage.

2876. The jet stream and associated clear air turbulence can sometimes be visually identified in flight by

1—long streaks of cirrus clouds.
2—dust or haze at flight level.
3—a constant outside air temperature.
4—a high-pressure center at flight level.

2877. A strong wind shear can be expected

1—on the low-pressure side of a jet stream core where the speed at the core is stronger than 110 knots.
2—in the jet stream front above a core having a speed of 60 to 90 knots.
3—where the 20-knot isotachs are spaced 100 NM or closer together.
4—if the 5° C isotherms are spaced between 7° to 10° of latitude.

2878. Which type of jet stream can be expected to cause the greater turbulence?

1—A straight jet stream associated with a low-pressure trough.
2—A jet stream associated with a wide isotherm spacing.
3—A curving jet stream associated with a deep low-pressure trough.
4—A jet stream occurring during the summer at the lower latitudes.

2879. The difference found by subtracting the temperature of a parcel of air theoretically lifted from the surface to 500MB and the existing temperature at 500MB, is called the

1—negative index.
2—positive index.
3—lifted index.
4—zero index.

2880. What is the standard temperature at 10,000 feet?

1— 5° C.
2— 0° C.
3— -5° C.
4— -10° C.

2881. What is the standard temperature at 20,000 feet?

1— -5° C.
2— -15° C.
3— -20° C.
4— -25° C.

2882. GIVEN:

Pressure altitude.....12,000 ft.
True air temperature.....+10° C

From the conditions given, the approximate density altitude is

1—10,700 ft.
2—11,900 ft.
3—14,000 ft.
4—14,900 ft.

2883. GIVEN:

Pressure altitude.....5,000 ft.
True air temperature.....+40° C

From the conditions given, the approximate density altitude is

1—5,500 ft.
2—6,900 ft.
3—8,100 ft.
4—8,800 ft.

2884. GIVEN:

Pressure altitude.....6,000 ft.
True air temperature.....+30° C

From the conditions given, the approximate density altitude is

1—7,000 ft.
2—8,000 ft.
3—9,000 ft.
4—10,000 ft.

2885. GIVEN:

Pressure altitude.....7,000 ft.
True air temperature.....+15° C

From the conditions given, the approximate density altitude is

1—8,000 ft.
2—8,500 ft.
3—9,500 ft.
4—10,000 ft.

2886. GIVEN:

Pressure altitude.....3,000 ft.
True air temperature.....+25° C

From the conditions given, the approximate density altitude is

1—3,600 ft.
2—4,100 ft.
3—4,600 ft.
4—5,300 ft.

2887. Fog produced by frontal activity is a result of saturation due to

1—evaporation of surface moisture.
2—nocturnal cooling.
3—evaporation of precipitation.
4—adiabatic cooling.

2888. A situation most conducive to the formation of advection fog is

1—an air mass moving inland from the coastline during the winter.
2—a warm, moist air mass settling over a cool surface under no-wind conditions.
3—a warm, moist air mass on the windward side of a mountain.
4—a light breeze moving colder air over a water surface.

2889. Advection fog has drifted over a coastal airport during the day. What may tend to dissipate or lift this fog into low stratus clouds?

1—Temperture inversion.
2—Nighttime cooling.
3—Wind 15 knots or stronger.
4—Surface radiation.

2890. What effect may tend to lift advection fog into low stratus clouds?

1—Surface winds of approximately 15 knots or stronger.
2—Dryness of the underlying land mass.
3—Nighttime cooling.
4—Heating from adjacent industrial areas.

2891. In what ways do advection fog, radiation fog, and steam fog differ in their formation or location?

1—Advection fog deepens as windspeed increases up to 20 knots; steam fog requires calm or very light wind; radiation fog forms when the ground or water cools the air by radiation.
2—Radiation fog is restricted to land areas; advection fog is most common along coastal areas; steam fog forms over a water surface.
3—Steam fog forms from moist air moving over a colder surface; advection fog requires cold air over a warmer surface; radiation fog is produced by radiational cooling of the ground.
4—Radiation fog results from cooling the air to its dew point, while steam and advection fog require the addition of moisture to the air near the surface, through evaporation.

2892. With respect to advection fog, which is true?

1—It forms almost exclusively at night or near daybreak.
2—It forms when unstable air is cooled adiabatically.
3—It is slow to develop, and dissipates quite rapidly.
4—It can appear suddenly during day or night, and it is more persistent than radiation fog.

2893. Ice pellets encountered during flight is normally evidence that

1—a cold front has passed.
2—there are thunderstorms in the area.
3—there exists a layer of warmer air above.
4—you can climb to a higher altitude without encountering more than light icing.

2894. What is indicated if ice pellets are encountered at 8,000 feet?

1—You are approaching an area of thunderstorms.
2—Freezing rain at higher altitude.
3—You will encounter hail if you continue your flight.
4—High altitude cold front or upper trough.

2895. A freezing level chart is an analysis of

1—forecast freezing level data from upper air observations.
2—observed freezing level data from upper air observations.
3—observed freezing level data from surface observations.
4—forecast freezing level data from surface observations.

2896. Which correctly describes the purpose of convective SIGMET's (WST)?

1—They cover specific areas of the country and contain information on observed icing, turbulence, and thunderstorm activity.
2—They contain both an observation and a forecast of all thunderstorm and hailstone activity. The forecast is valid for 1 hour only.
3—They consist of an hourly observation of tornadoes, significant thunderstorm activity, and large hailstone activity.
4—They consist of either an observation and a forecast or just a forecast for tornadoes, significant thunderstorm activity, or hail greater than or equal to 3/4 inch in diameter.

2897. What wind conditions would you anticipate when squalls are reported at your destination?

1—Peak gusts of at least 35 knots combined with a change in wind direction of 30° or more.
2—Sudden increases in windspeed of at least 15 knots to a sustained speed of 20 knots or more for at least 1 minute.
3—Rapid variations in windspeed of 15 knots or more between peaks and lulls.
4—Variations of at least 90° in wind direction when windspeeds are above 20 knots.

2898. What significant cloud coverage is reported by a pilot in this SA?

MOB M9 OVC 2LF 131/44/43/3212/991/UA/OV
15NW MOB 1355/SK OVC Ø25/Ø75/OVC 135

1—The top of lower overcast is 2,500 feet; base and top of second overcast layer is 7,500 and 13,500 feet respectively.
2—The base of second overcast layer is 2,500 feet; top of second overcast layer is 7,500 feet; base of third layer is 13,500 feet.
3—Three separate overcast layers exist with tops at 2,500, 7,500, and 13,500 feet.
4—Three separate overcast layers exist with bases at 2,500, 7,500, and 13,500 feet.

2899. What significant cloud coverage is reported by a pilot in this SA?

MOB...M9 OVC 2LF 131/44/43/3212/991/UA/OV
15NW MOB 1355/SK OVC Ø25/Ø45 OVC Ø9Ø

1—Three separate overcast layers exist with tops at 2,500, 7,500, and 13,500 feet.
2—Three separate overcast layers exist with bases at 2,500, 7,500, and 13,500 feet.
3—The top of lower overcast is 2,500 feet; base and top of second overcast layer is 4,500 and 9,000 feet respectively.
4—The base of second overcast layer is 2,500 feet; top of second overcast layer is 7,500 feet; base of third layer is 13,500 feet.

2900. A pilot reporting turbulence that momentarily causes slight, erratic changes in altitude and/or attitude should report it as

1—light turbulence.
2—moderate turbulence.
3—light chop.
4—moderate chop.

2901. When turbulence causes changes in altitude and/or attitude but aircraft control remains positive, that should be reported as

1—light.
2—very light.
3—severe.
4—moderate.

2902. Turbulence that is encountered above 15,000 feet AGL not associated with cumuliform cloudiness, including thunderstorms, should be reported as

1—convective turbulence.
2—severe turbulence.
3—orographic turbulence.
4—clear air turbulence.

2903. What is the cloud condition reported in the pilot report shown in Figure 58?

1—Base of the broken layer 400 feet AGL and tops at 1,000 feet AGL.
2—Tops of the lower broken clouds 4,000 feet MSL with higher broken at 10,000 feet MSL.
3—One broken layer with bases at 4,000 feet MSL and tops at 10,000 feet MSL.
4—Lower broken clouds with tops 4,000 feet AGL. Base of the higher layer 10,000 feet AGL.

PIREP

UA/OV IAD–CRW 1640 FL065
/TP PA32 /SK BKN 040/100 BKN
/TB OCNL LGT–MDT CHOP
/RM RDGS OBSCD

Figure 58

2904. Special VFR applies to which airspace?

1—Airport advisory area.
2—Control zone.
3—Positive control area.
4—Control area.

2905. Select the true statement concerning a restricted area.

1—Restricted areas denote the existence of unusual and often invisible hazards to aircraft.
2—A restricted area is that airspace which contains the intensive training activities of military student jet pilots.
3—Restricted areas have been established over international waters.
4—Flight within this airspace is prohibited.

2906. A clearance to taxi to the active runway means a pilot has been given permission to taxi

1—to the active runway and to take off.
2—via taxiways and across intersecting runways to, but not on, the active runway.
3—to and hold in takeoff position on the active runway.
4—on taxiways to the active runway without crossing any intersecting runways.

2907. During the after–landing roll at night on a runway which has in–runway lighting installed, if a series of alternating red and white lights is seen in the centerline lighting, it indicates that

1—3,000 feet of runway remain.
2—1,000 feet of runway remain.
3—one–half of the runway remains.
4—there are no taxiway turnoffs until reaching the end of the runway.

2908. During the after–landing roll at night on a runway which has in–runway lighting installed, if a series of red lights is seen in the centerline lighting, it indicates that

1—3,000 feet of runway remain.
2—1,000 feet of runway remain.
3—one–half of the runway remains.
4—there are no taxiway turnoffs until reaching the end of the runway.

2909. Select the true statement pertaining to airport traffic areas.

1—To operate within these areas, the pilot must possess at least a private pilot certificate.
2—When passing over these areas, aircraft are required to be at least 4,000 feet above the surface.
3—These areas should be avoided unless landing or taking off from airports within the areas, or unless otherwise authorized by air traffic control.
4—Airport traffic areas are depicted on Sectional Aeronautical Charts by a broken line circle.

2910. Two airports, one with an operating control tower and one without, are located within the same airport traffic area. Air traffic control authorization is required for operations to and from

1—the tower–controlled airport only, but not for flying through the area.
2—the tower–controlled airport only, and for flying through the area.
3—both airports, but not for flying through the area.
4—both airports and for flying through the area.

2911. Unless otherwise authorized, two–way radio communications with the air traffic control tower is required when operating an aircraft within which of the following designated airspaces, regardless of weather conditions?

1—Control zones.
2—Airport advisory areas.
3—Airport traffic areas.
4—Control areas.

2912. If an airport without a control tower is located within an airport traffic area, air traffic control authorization is required for landing at

1—the tower–controlled airport only, and for flight through the area.
2—both airports and for flight through the area.
3—both airports but not for flight through the area.
4—the tower–controlled airport only, but not for flight through the area.

2913. When entering an airport traffic area, what is the minimum altitude at which a turbine–powered or large aircraft may be flown until further descent is required for a safe landing?

1—2,000 feet AGL.
2—1,500 feet AGL.
3—1,000 feet AGL.
4—500 feet AGL.

2914. Unless otherwise directed, when approaching to land at an airport with an operating control tower, the pilot of an airplane shall

1—initially enter the downwind leg of the active runway.
2—circle the airport to the right.
3—circle the airport to the left.
4—initially enter the base leg of the active runway.

2915. May an airport that has no approved instrument approach procedure be selected as an alternate on an IFR flight plan?

1—Yes; providing the current weather forecasts indicate that at the ETA a descent from the MEA, approach, and landing can be completed under basic VFR conditions.
2—Yes; providing that airport is serviced by an airport surveillance radar unit.
3—Yes; but this applies to airplanes only.
4—No; only those airports that have approved instrument approach procedures may be selected as alternates.

2916. When may an airport which does not have a published instrument approach be used as an alternate?

1—When the existing ceiling and visibility is at least 2,000 feet and 3 miles.
2—When the ceiling and visibility forecast for your ETA is at least 1,500 feet and 5 miles.
3—When the forecast ceiling and visibility from 2 hours before to 2 hours after your ETA is at least 1,000 feet and 3 miles.
4—When the ceiling and visibility minimums permit descent from the MEA, approach, and landing under basic VFR.

2917. What minimum weather conditions must be forecast for your ETA at an alternate airport that has no approved instrument approach procedure in order to list it on your IFR flight plan?

1—600-foot ceiling and 2 SM visibility.
2—800-foot ceiling and 2 SM visibility.
3—1,000-foot ceiling and 1 SM visibility.
4—Adequate ceiling and visibility to allow descent from MEA, approach, and landing under basic VFR.

2918. An airport has a nonprecision approach procedure only. To list that airport as an alternate on an IFR flight plan, the forecast (at ETA) for that airport should be at or above

1—600 feet/2 miles.
2—800 feet/2 miles.
3—1,000 feet/2 miles.
4—2,000 feet/3 miles.

2919. Which procedure is recommended if radio communications failure is experienced while operating VFR within a TCA?

1—If arriving, the pilot should immediately turn 180° and remain clear of the TCA.
2—If arriving, the pilot should adjust the transponder to code 7600 and proceed to the airport of intended landing.
3—If departing, the pilot should adjust the transponder to code 7700 and hold over the nearest visual checkpoint for 1 minute before departing.
4—If departing, the pilot should exit the TCA using the shortest possible route.

2920. In a control zone, what restriction may be represented by the operation of an airport's rotating beacon during daylight hours?

1—An ATC clearance may be required for takeoffs and landings.
2—The tower is temporarily shut down.
3—There are unreported obstructions on the airport.
4—A right-hand traffic pattern is in effect.

2921. Which is true regarding blue and magenta colors used to depict airports on Sectional Aeronautical Charts?

1—Airports having air-to-ground communications are shown in blue; airports with no means of communication are shown in magenta.
2—Airports having runways capable of handling large aircraft are shown in blue; all others in magenta.
3—Airports having airport traffic areas are shown in blue; all others in magenta.
4—Airports having concrete runways are shown in blue; all others in magenta.

2922. Although MOCA's assure adequate terrain clearance along an airway, they assure acceptable navigational signal coverage only within

1—22 NM of a VOR.
2—32 NM of a VOR.
3—50 NM of a VOR.
4—12 NM of a VOR.

2923. Which communication is required when VFR and inbound to land at a controlled airport?

1—Report after turning on base leg.
2—Report entering downwind after established at traffic pattern altitude.
3—Maintain two-way communications with the tower while in the airport traffic area.
4—Report turning final.

2924. If the aircraft's radio fails, what is the recommended procedure when landing at a controlled airport?

1—Observe the traffic flow, enter the pattern, and look for a light signal from the tower.
2—Enter a crosswind leg and rock the wings.
3—Flash the landing lights and cycle the landing gear while circling the airport.
4—Select 7700 on the transponder and fly a normal traffic pattern.

2925. As standard operating practice, all inbound traffic to an airport without a control tower should continuously monitor the appropriate facility from a distance of

1—10 miles.
2—15 miles.
3—20 miles.
4—25 miles.

2926. Excluding Hawaii, the vertical limits of the Federal Low Altitude airways extend from

1—700 feet AGL up to, but not including, 14,500 feet MSL.
2—1,200 feet AGL up to, but not including, 18,000 feet MSL.
3—1,200 feet AGL up to, but not including, 14,500 feet MSL.
4—1,500 feet AGL up to, but not including, 24,000 feet MSL.

2927. One of the major differences between control zones and control areas is that all control zones

1—begin at the surface, while all control areas begin at an altitude of 700 feet or higher above the surface.
2—always begin at 700 feet AGL while control areas always begin at 1,200 feet above the surface.
3—are located around tower–controlled airports only.
4—have higher basic VFR weather minimums than control areas.

2928. With certain exceptions, the Continental Control Area extends upward from

1—the surface.
2—10,000 feet MSL.
3—14,500 feet MSL.
4—18,000 feet MSL.

2929. Within the contiguous United States, the vertical limit of control zones extends from the surface upward to,

1—but not including, 3,000 feet AGL.
2—but not including, 10,000 feet MSL.
3—the base of the Continental Control Area.
4—infinity.

2930. Which is true regarding control areas?

1—Their basic VFR minimums are greater than those of control zones.
2—They start at an altitude of 700 feet or higher above the surface.
3—They start at the surface and extend upward to the base of the Continental Control Area.
4—They are located at tower–controlled airports only.

2931. If an emergency requiring immediate action causes a pilot to deviate from a rule in FAR Part 91, what is the responsibility of that pilot?

1—A written report of the deviation shall be submitted only if requested by the Administrator.
2—A written report shall be made immediately to the nearest Air Carrier District Office upon landing at destination.
3—No report is necessary unless priority handling by ATC was required.
4—A written report of the deviation must be submitted within 7 calendar days to the Administrator.

2932. Which statement concerning terminal control areas is true?

1—Flight plans are required for flight operations in Group II terminal control areas.
2—Terminal control areas start at ground level and extend upward to, but not including, the base of positive control areas.
3—Flight under visual flight rules is not permitted in Group I terminal control areas.
4—No person may operate an aircraft in either a Group I or a Group II terminal control area unless an appropriate authorization from ATC has been received.

2933. Which statement is true regarding VFR operations in terminal control areas?

1—Flight under visual flight rules is not authorized within Group I terminal control areas.
2—Solo student pilots are not authorized to take off or land at airports that are located within Group I terminal control areas.
3—When operating within Group II terminal control areas, VOR receivers are not required.
4—Flight plans are required to be filed prior to operating within Group II terminal control areas.

2934. Which equipment is required when operating an airplane within a Group I Terminal Control Area?

1—An operable autopilot.
2—A 4096 code transponder with Mode C capability.
3—A VOR receiver with distance measuring equipment.
4—An automatic direction finder.

2935. In which of the following flight operations is the pilot in command required to possess an instrument rating while operating in VFR conditions?

1—On a DVFR flight plan.
2—In a positive control area.
3—On an international flight.
4—Flight in the Continental Control Area.

2936. Aircraft position lights are required to be lighted starting at

1—sunset.
2—1 hour after sunset.
3—30 minutes after sunset.
4—30 minutes before sunset.

2937. Position lights are required to be displayed on all aircraft in flight beginning from

1—1 hour before sunset to 1 hour after sunrise, and any time the flight visibility is less than 1 mile.
2—30 minutes before sunset to 30 minutes after sunrise.
3—sunset to sunrise.
4—30 minutes after sunset to 30 minutes before sunrise.

2938. A pilot given landing priority by air traffic control after declaring an emergency in flight is

1—required to make a written report of the emergency to the nearest General Aviation District Office.
2—required, if requested by air traffic control, to submit a detailed report of the emergency to the chief of that air traffic control facility within 48 hours.
3—not required to submit a report of the emergency, unless requested by the Administrator of the FAA.
4—not required to submit a written report unless there was damage to the aircraft.

2939. If a flashing red light from the tower is received while holding on a runway for takeoff, the pilot should

1—return to the starting point.
2—taxi clear of the runway in use.
3—hold the position.
4—take off immediately.

2940. A flashing red light from the control tower during a landing approach means

1—give way to faster traffic; circle until cleared.
2—give way to other traffic.
3—land; exercise extreme caution.
4—the airport is unsafe; do not land.

2941. Except when necessary for takeoff or landing, what is the minimum safe altitude above the highest obstacle that must be maintained over a congested area?

1—500 feet.
2—1,000 feet.
3—1,500 feet.
4—2,000 feet.

2942. Over sparsely populated areas, an aircraft may not be operated (except when necessary for takeoff or landing) closer than what distance from any person, vehicle, or structure?

1—100 feet.
2—500 feet.
3—1,000 feet.
4—2,000 feet.

2943. The minimum safe altitude which applies anywhere is

1—an altitude which permits an emergency landing without undue hazard to persons or property in the event of a power failure.
2—500 feet above the surface, except over open water or sparsely populated areas.
3—1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.
4—500 feet above the surface.

2944. The fixed green lights arranged symmetrically left and right of the runway centerline identify the

1—touchdown zone.
2—runway threshold.
3—VASI touchdown point.
4—beginning of a runway roll-out area.

2945. When operating VFR in an MOA, a pilot

1—must obtain a clearance from the controlling agency prior to entering the MOA.
2—may operate only on the airways that transverse the MOA.
3—should exercise extreme caution when military activity is being conducted.
4—must operate only when military activity is not being conducted.

2946. If a pilot inbound to a TRSA does not want stage service, what should the pilot do?

1—Enter no service in the remarks section of the flight plan.
2—Advise the closest FSS "negative TRSA" with aircraft call sign.
3—Broadcast in the blind on 121.5, "no radar required."
4—The pilot should state "negative stage (number)" on initial contact.

2947. Airport advisory areas exist only at airports with

1—operating control towers.
2—operating flight service stations.
3—radar approach and departure service.
4—automatic terminal information service.

2948. The letters VHF/DF appearing in the Airport/Facility Directory for a certain airport, indicate that

1—this airport is designated as an airport of entry.
2—the flight service station has equipment with which to determine your direction from the station.
3—this airport has a direct-line phone to the flight service station.
4—this airport is a defense facility.

2949. Which procedure is recommended to avoid midair collisions during VFR climbs or descents along Federal airways?

1—Fly to the right side of the centerline of the airway until arriving at the desired altitude.
2—Remain at least 4 NM on either side of the centerline of the airway until arriving at the desired altitude.
3—Contact the nearest FAA FSS for any pertinent traffic advisories.
4—Execute gentle banked turns left and right at a frequency which permits continuous visual scanning.

2950. Air traffic control authorization is not required prior to operating within the boundaries of

1—a Group I Terminal Control Area.
2—a Group II Terminal Control Area.
3—a Stage III Terminal Radar Service Area.
4—an airport traffic area inside a Terminal Control Area.

2951. While operating in the traffic pattern of a controlled airport, pilots may adjust flight to achieve proper spacing without ATC approval by

1—executing shallow S turns.
2—climbing or descending at the pilot's descretion.
3—executing 180° turns with shallow banks.
4—executing 360° turns.

2952. When a pilot accepts an ATC clearance to follow another aircraft to a landing, that pilot is responsible for maintaining

1—a minimum of 2-mile separation from all other aircraft in the traffic pattern.
2—wake turbulence separation.
3—a minimum of 5-mile separation from all other aircraft in the traffic pattern.
4—a minimum of 2-minute elapsed time before landing behind another aircraft.

2953. When approaching an unfamiliar airport with no tower or FSS in operation, which flight procedure is recommended for arriving VFR aircraft?

1—Fly over or circle the airport at least 500 feet above traffic pattern altitude before entering the pattern.
2—Descend into the traffic pattern from directly above the airport.
3—Enter on a long final to the runway presumed to be the active runway and watch for traffic on the base leg.
4—Enter downwind or base leg to the runway you believe is currently being used.

2954. What designated airspace associated with an airport becomes inactive when the control tower at that airport is not in operation?

1—Control zone.
2—Airport traffic area.
3—Airport advisory area.
4—Terminal control area.

2955. Regulations which refer to commercial operators relate to that person who

1—is the owner of a scheduled airline.
2—is a required crewmember aboard an airline transport aircraft.
3—for compensation or hire, engages in the carriage by aircraft in air commerce of persons or property, other than as an air carrier.
4—acts as pilot in command of an air carrier aircraft.

2956. Regulations which refer to operator relate to that person who

1—acts as pilot in command of the aircraft.
2—is a required crewmember aboard the aircraft.
3—is the sole manipulator of the aircraft controls.
4—causes the aircraft to be used or authorizes its use.

2957. Regulations which refer to the operational control of a flight are in relation to

1—acting as the sole manipulator of the aircraft controls.
2—the specific duties of any required crewmember.
3—exercising authority over initiating, conducting, or terminating a flight.
4—exercising the privileges of pilot in command of an aircraft.

2958. Which is the correct symbol for the stalling speed or the minimum steady flight speed in a specified configuration?

1—V_2 min.
2—V_{S1}.
3—V_S.
4—V_{SO}.

2959. Which is the correct symbol for the stalling speed or the minimum steady flight speed at which the airplane is controllable?

1—V_{SO}.
2—V_2.
3—V_S.
4—V_{S1}.

2960. FAR Part 1 defines V_F as

1—design flap speed.
2—design cruising speed.
3—maximum flap extended speed.
4—flap operating speed.

2961. FAR Part 1 defines V_{LE} as

1—maximum landing gear extended speed.
2—maximum landing gear operating speed.
3—maximum speed in landing configuration.
4—maximum speed in steady flight with critical engine inoperative and landing gear extended.

2962. If the operational category of an airplane is listed as utility, it would mean that this airplane could be operated in which of the following maneuvers?

1—Any maneuver except acrobatics or spins.
2—All types of acrobatics.
3—Any maneuver that requires an abrupt change in attitude.
4—Limited acrobatics, incluading spins.

2963. What is the maximum indicated airspeed allowed in the airspace underlying a terminal control area or in a VFR corridor designated through a terminal control area?

1—230 knots.
2—200 knots.
3—180 knots.
4—156 knots.

2964. The maximum indicated airspeed permitted when operating a reciprocating engine aircraft within an airport traffic area located outside a terminal control area is

1—156 knots.
2—180 knots.
3—200 knots.
4—230 knots.

2965. What is the minimum altitude required for acrobatic flight?

1—3,000 feet AGL.
2—2,000 feet MSL.
3—1,500 feet AGL.
4—1,000 feet MSL.

2966. What is the minimum flight visibility required for acrobatic flight?

1—5 miles.
2—3 miles.
3—2 miles.
4—1 mile.

2967. What is the purpose and correct use of VFR corridors provided at some TCA locations?

1—The corridor is included in the TCA airspace and allows VFR aircraft to transit the TCA, but still requires participating aircraft to establish and maintain contact with ATC.
2—The corridor is airspace excluded from the TCA which allows VFR aircraft to overfly the principal airport or follow another route through the area. The pilot is not required to contact ATC or meet TCA transponder requirements.
3—The corridor is included in the TCA airspace and allows VFR aircraft to follow established routes to and from the principle airport. Participating pilots are assigned altitudes and given a clearance with no further contact required.
4—The corridor is controlled airspace but excluded from the TCA and allows VFR aircraft to penetrate the TCA. Pilots are given assigned altitudes by ATC but must maintain their own visual separation. Transponder requirements must be met.

2968. An airship is being flown before sunrise and official sunrise is 0718. When are the aircraft's position lights required to be lighted?

1—They must remain lighted until 0648.
2—They must remain lighted until 0618.
3—They must remain lighted until 0718.
4—They must remain lighted until 0748.

2969. If not equipped with required position lights, an aircraft must terminate flight

1—when it is too dark to see prominent unlighted objects from a distance of 1 mile.
2—1 hour after sunset.
3—at sunset.
4—30 minutes after sunset.

2970. If a gyroplane is not equipped with position lights, the pilot should terminate the flight at

1—sunset.
2—30 minutes after sunset.
3—45 minutes after sunset.
4—1 hour after sunset.

2971. If a free balloon does not meet the requirements for night flight and official sunset is 1730 EST, the latest that a balloon may be flown and not violate regulations is

1—1630 EST.
2—1730 EST.
3—1800 EST.
4—1830 EST.

2972. A helicopter in operation is required to have lighted position lights displayed during what period of time?

1—During the hours of darkness and anytime the flight visibility is less than 5 miles.
2—From 1 hour before sunset to 1 hour after sunrise.
3—From 30 minutes before sunset to 30 minutes after sunrise.
4—From sunset to sunrise.

2973. To operate an airplane under special VFR within a control zone at night, which of the following is required?

1—The control zone must have an approach control facility.
2—The ceiling within the control zone must be at least 500 feet.
3—The pilot must hold an instrument pilot rating and the airplane must be equipped for instrument flight.
4—The control zone must be specifically designated as a night special VFR control zone.

2974. No person may operate an airplane in a control zone under a special VFR clearance at night unless that person

1—meets the applicable requirements for instrument flight and the airplane is equipped as required for instrument flight.
2—uses the runway which is served by an operating visual approach slope indicator.
3—holds at least a commercial pilot certificate and an instrument rating.
4—enters the airport traffic area at or above 1,500 feet AGL and maintains that altitude until descending for a landing.

2975. Which of the following is a requirement for operating an airplane during the time between official sunset and sunrise under special VFR in a control zone?

1—The pilot must hold at least a commercial pilot certificate.
2—The flight visibility must be at least 3 miles.
3—The flight must be able to remain at least 500 feet below the clouds.
4—The airplane must be equipped for IFR flight.

2976. Except when necessary for takeoff or landing or unless otherwise authorized by the Administrator, the minimum altitude for IFR flight is

1—2,000 feet over the highest obstacle.
2—3,000 feet over the highest obstacle.
3—2,000 feet over designated mountainous terrain; 1,000 feet over terrain elsewhere.
4—3,000 feet over designated mountainous terrain; 2,000 feet over terrain elsewhere.

2977. VFR cruising altitudes are required to be maintained when flying

1—at 3,000 feet or more AGL; based on true course.
2—more than 3,000 feet AGL; based on magnetic course.
3—at 3,000 feet or more above MSL; based on magnetic heading.
4—more than 3,000 feet MSL; based on true heading.

2978. What is the maximum cumulative time an emergency locator transmitter can be operated before the non-rechargeable batteries must be replaced?

1—30 minutes.
2—45 minutes.
3—1 hour.
4—2 hours

2979. Rechargeable batteries used in emergency locator transmitters must be recharged before what percent of the useful life of their charge has been depleted?

1—25 percent.
2—50 percent.
3—75 percent.
4—90 percent.

2980. The expiration date for batteries used in emergency locator transmitters can be found on the

1—instrument panel.
2—radio station license.
3—outside of the transmitter.
4—Airworthiness Certificate.

2981. What is the maximum distance from an airport that an airplane engaged in training operations may be operated without an ELT?

1—10 miles.
2—25 miles.
3—50 miles.
4—75 miles.

2982. No person may operate a large civil U.S. aircraft which is subject to a lease, unless the lessee has mailed a copy of the lease to the FAA Mike Monroney Aeronautical Center in Oklahoma City within

1—24 hours of its execution.
2—48 hours of its execution.
3—72 hours of its execution.
4—96 hours of its execution.

2983. Which is true with respect to formation flights?

1—Formation flights must be performed above 1,500 feet AGL.
2—Formation flights are not authorized within controlled airspace.
3—Formation flights are not authorized when carrying passengers for hire.
4—Formation flights are not authorized under any circumstances.

2984. Formation flight while carrying passengers for hire is

1—authorized if the passengers are so informed prior to the flight.
2—not authorized, except when operating outside of controlled airspace.
3—not authorized under any circumstances.
4—authorized, if previous arrangements have been made with the other pilot/pilots.

2985. Airplane A is overtaking airplane B, which airplane has the right-of-way?

1—Airplane A, the pilot should alter course to the right to pass.
2—Airplane B, the pilot should expect to be passed on the right.
3—Airplane A, the pilot should alter course to the left to pass.
4—Airplane B, the pilot should expect to be passed on the left.

2986. To operate an airplane outside controlled airspace at an altitude of more than 1,200 feet AGL but less than 10,000 feet MSL, regulations require a flight visibility of no less than

1—1 mile.
2—2 miles.
3—3 miles.
4—5 miles.

2987. To operate an aircraft in controlled airspace at more than 1,200 feet AGL but less than 10,000 feet MSL, the flight visibility should be at least

1—1 mile.
2—2 miles.
3—3 miles.
4—5 miles.

2988. To operate an airship outside controlled airspace at an altitude of more than 1,200 feet AGL but less than 10,000 feet MSL, regulations require a flight visibility of no less than

1—1 mile.
2—2 miles.
3—3 miles.
4—5 miles.

2989. What is the minimum basic VFR flight visibility for all flights at or above 10,000 feet MSL and more than 1,200 feet AGL?

1—1 mile in uncontrolled airspace, 3 miles in controlled airspace.
2—3 miles during daylight hours, and 5 miles during hours of darkness.
3—3 miles.
4—5 miles.

2990. When flying a glider in uncontrolled airspace below 10,000 feet MSL, what is the minimum flight visibility required?

1—1/2 SM.
2—1 SM.
3—3 SM.
4—5 SM.

2991. When flying a glider above 10,000 feet MSL and more than 1,200 feet AGL, what minimum flight visibility is required?

1—2 SM.
2—3 SM.
3—5 SM.
4—7 SM.

2992. The minimum flight visibility for VFR flight increases from 3 to 5 miles beginning at an altitude of

1—10,000 feet MSL regardless of height above ground.
2—10,000 feet MSL if above 1,200 feet AGL.
3—14,500 feet MSL.
4—18,000 feet MSL.

2993. What minimum distance from clouds must be maintained when operating a free balloon outside controlled airspace at an altitude above 1,200 feet AGL but less than 10,000 feet MSL?

1—Remain clear of clouds.
2—500 feet above, 1,000 feet below, and 2,000 feet horizontally.
3—1,000 feet above, 500 feet below, and 2,000 feet horizontally.
4—1,000 feet above, 1,000 feet below, and 1 mile horizontally.

2994. What is the minimum distance from clouds which must be maintained when operating an aircraft outside controlled airspace at an altitude above 1,200 feet AGL but less than 10,000 feet MSL?

1—Remain clear of clouds.
2—500 feet above, 1,000 feet below, and 2,000 feet horizontally.
3—1,000 feet above, 1,000 feet below, and 1 mile horizontally.
4—1,000 feet above, 500 feet below, and 2,000 feet horizontally.

2995. During VFR operations outside controlled airspace at altitudes of less than 1,200 feet AGL, what is the minimum distance from clouds requirement?

1—Remain clear of clouds.
2—500 feet above, 1,000 feet below, and 2,000 feet horizontal.
3—500 feet above, 500 feet below, and 1,000 feet horizontal.
4—1,000 feet above, 1,000 feet below, and 1,500 feet horizontal.

2996. During operations within controlled airspace at altitudes of more than 1,200 feet AGL, but less than 10,000 feet MSL, the minimum horizontal distance from clouds requirement for VFR flight is

1—500 feet.
2—1,000 feet.
3—1,500 feet.
4—2,000 feet.

2997. In what airspace would the minimum vertical distance of 500 feet below or 1,000 feet above cloud formations apply to VFR operation of a glider?

1—Outside controlled airspace at all altitudes beginning at the surface and extending up to but not including 10,000 feet MSL.
2—Only within controlled airspace when below 10,000 feet MSL.
3—At or above 10,000 feet MSL.
4—Outside controlled airspace at an altitude of more than 1,200 feet above the surface but less than 10,000 feet MSL.

2998. What is the minimum flight visibility and proximity to cloud requirements for VFR flight, at 6,500 feet MSL, in a control area?

1—1,000 feet above or 500 feet below; 3 miles visibility.
2—1,000 feet below or 500 feet above; 3 miles visibility.
3—1,000 feet above or 500 feet below; 1 mile visibility.
4—1,000 feet below or 500 feet above; 1 mile visibility.

2999. Which minimum flight visibility and distance from clouds is required for a VFR helicopter flight outside of controlled airspace at 3,500 feet MSL over terrain with an elevation of 1,900 feet?

1—Visibility – 1 mile; distance from clouds – 1,000 feet below, 1,000 feet above, and 1,000 feet horizontally.
2—Visibility – 3 miles; distance from clouds – 1,000 feet below, 1,000 feet above, and 1 mile horizontally.
3—Visibility – 1 mile; distance from clouds – 500 feet below, 1,000 feet above, and 2,000 feet horizontally.
4—Visibility – 3 miles; distance from clouds – 500 feet below, 1,000 feet above, and 2,000 feet horizontally.

3000. Special VFR minimums apply to operations within what type airspace?

1—Airport traffic areas.
2—Control zones.
3—Control areas.
4—Restricted areas.

3001. When operating an airplane beneath the ceiling within a control zone under special VFR, what minimum distance from clouds and what visibility are required?

1—Remain clear of clouds, and the ground visibility must be at least 2 miles.
2—500 feet beneath clouds, and the ground visibility must be at least 1 mile.
3—Remain clear of clouds, and the flight visibility must be at least 1 mile during landing or takeoff.
4—500 feet beneath clouds, and the flight and ground visibility must be at least 3 – 5 miles.

3002. A special VFR clearance to enter a control zone requires that while in the control zone the pilot remain

1—at least 500 feet from all clouds.
2—at least 1,000 feet from all clouds.
3—at least 2,000 feet from all clouds.
4—clear of clouds.

3003. To depart under basic VFR weather minimums from an airport that is located within a control zone, the weather at that airport must be

1—such that the pilot can remain clear of clouds and have 1 mile visibility regardless of the ceiling.
2—a ceiling of 500 feet or more and a visibility of at least 5 miles.
3—a ceiling of 1,000 feet or more and a visibility of at least 3 miles.
4—a visibility of at least 1 mile, regardless of the ceiling.

3004. What is the flight visibility required, by the special VFR weather minimums of FAR Part 91, for the operation of an airplane in a control zone?

1—At least 1 SM.
2—At least 2 SM.
3—At least 3 SM.
4—At least 5 SM.

3005. Basic VFR weather minimums require at least which visibility for operating a helicopter within a control zone and beneath a cloud ceiling?

1—1 mile.
2—2 miles.
3—3 miles.
4—5 miles.

3006. Regulations require that while in a control zone under special VFR, the pilot remain

1—clear of clouds.
2—at least 500 feet from clouds.
3—at least 1,000 feet from clouds.
4—at least 2,000 feet from clouds.

3007. The basic VFR weather minimum regulation states, in part, that no person may operate an aircraft within a control zone beneath the ceiling when the ceiling is less than

1—500 feet.
2—1,000 feet.
3—1,200 feet.
4—1,500 feet.

3008. Regulations stipulate that at an airport located within a control zone and at which ground visibility is not reported, takeoffs and landings of airplanes under special VFR are

1—not authorized.
2—authorized if the flight visibility is at least 1 mile.
3—authorized only if another airport in that control zone reports a ground visibility of 1 mile.
4—not restricted by visibility requirements.

3009. At some airports located within control zones where ground visibility is not reported, takeoffs and landings of airplanes under special VFR are

1—not subject to visibility requirements.
2—authorized by ATC if the flight visibility is at least 1 mile.
3—authorized only if the ground visibility is observed to be at least 3 miles.
4—not authorized.

3010. Who is primarily responsible for maintaining an aircraft in an airworthy condition?

1—Owner only.
2—Pilot in command.
3—Operator or owner of the aircraft.
4—Mechanic who signs the maintenance records.

3011. Who is responsible for determining when maintenance is to be performed on an aircraft?

1—Owner or operator.
2—Pilot in command.
3—Maintenance personnel.
4—FAA certificated mechanic.

3012. Who is responsible for determining when maintenance is to be performed on a free balloon?

1—Pilot in command.
2—FAA certificated mechanic.
3—Owner or operator.
4—Maintenance personnel.

3013. Assuring compliance with an Airworthiness Directive is the responsibility of the

1—pilot in command of that aircraft.
2—owner or operator of that aircraft.
3—National Transportation Safety Board.
4—FAA certificated mechanic.

3014. The responsibility for ensuring that a glider is maintained in an airworthy condition is primarily that of the

1—pilot in command of the glider.
2—owner or operator of the glider.
3—person who conducts the maintenance and inspections of the glider.
4—certificated mechanic who signs the glider maintenance records.

3015. Who is primarily responsible for maintaining an airship in an airworthy condition?

1—Pilot in command.
2—Owner or operator.
3—FAA certificated mechanic.
4—Maintenance personnel.

3016. Who is responsible for determining when maintenance is to be performed on an airship?

1—Pilot in command.
2—Maintenance personnel.
3—Owner or operator.
4—FAA certificated mechanic.

3017. Ensuring that the appropriate entries are made in the maintenance records approving the aircraft for return to service is the responsibility of the

1—pilot in command.
2—maintenance personnel.
3—owner/operator of the aircraft.
4—FAA maintenance inspector.

3018. After maintenance who is responsible for ensuring the appropriate entries are made in the maintenance logbook to indicate that an aircraft has been approved for return to service?

1—Pilot in command of the aircraft.
2—Owner or operator of the aircraft.
3—Mechanic who performs the maintenance.
4—Operator of the aircraft only.

3019. After an annual inspection has been completed and the aircraft has been returned to service, an appropriate notation should be made on the

1—instrument panel inspection sticker.
2—Airworthiness Certificate.
3—repair and alteration form or operating placards.
4—aircraft maintenance records.

3020. The validity of the airworthiness certificate is maintained by

1—performance of an annual inspection.
2—performance of an annual inspection and a 100-hour inspection prior to their expiration date.
3—applying for a new airworthiness certificate each year.
4—an appropriate return to service statement in the aircraft maintenance records upon the completion of required inspections and maintenance.

3021. If an aircraft's operation in flight was substantially affected by an alteration or repair, the aircraft documents must show that it was test flown and approved for return to service by an appropriately-rated pilot prior to being operated

1—away from the vicinity of the airport.
2—with passengers aboard.
3—for compensation or hire.
4—by any private pilot.

3022. Passengers should not be carried in a gyroplane that has been altered in a manner which may have appreciably changed its flight characteristics, unless a test flight has been accomplished by

1—an FAA maintenance inspector.
2—at least a private pilot with a gyroplane rating.
3—any gyroplane rated pilot who holds an appropriate mechanic's certificate.
4—at least a commercial pilot.

3023. An airplane used for hire has been on a schedule of inspection every 100 hours of time in service. Under which condition, if any, may the airplane be operated beyond 100 hours without a new inspection?

1—The airplane may be dispatched for a flight of any duration as long as 100 hours has not been exceeded at the time it departs.
2—The airplane may be flown for any flight as long as the time in service has not exceeded 110 hours.
3—The airplane cannot exceed 100 hours time in service under any condition.
4—The 100 hours limitation may be exceeded by not more than 10 hours, if necessary to reach a place at which the inspection can be done.

3024. After only 80 hours of time in service, an annual inspection was completed on an airplane which is operated for hire. The next 100-hour inspection will be due within

1—20 hours of time in service.
2—80 hours of time in service.
3—100 hours of time in service.
4—120 hours of time in service.

3025. An airplane is given a 100-hour inspection 10 hours past due. If the time in service is 1,870 hours at the time of the inspection, the next 100-hour inspection would be due at what time in service?

1—1,940 hours.
2—1,950 hours.
3—1,960 hours.
4—1,970 hours.

3026. If the 100-hour inspection period was exceeded by 7 hours, the next 100-hour inspection is due within how many hours of time in service?

1—90 hours.
2—93 hours.
3—97 hours.
4—107 hours.

3027. After only 75 hours of time in service, an annual inspection was completed on a helicopter which is used to carry passengers for hire. Unless another annual inspection is conducted during the ensuing time, a 100-hour inspection will be due within the next

1—10 hours of time in service.
2—25 hours of time in service.
3—75 hours of time in service.
4—100 hours of time in service.

3028. A glider must have a 100-hour inspection and be approved for return to service for which of the following operations?

1—In any type of glider operation.
2—In soaring competition.
3—To carry nonpaying passengers.
4—Carrying a person for hire.

3029. Which is true concerning required maintenance inspections of an airship?

1—A 100-hour inspection may be substituted for an annual inspection.
2—An annual inspection is required even if a progressive inspection system has been approved.
3—An annual inspection may be substituted for a 100-hour inspection.
4—It is not permissible to substitute one inspection for another.

3030. Which is true relating to AD's (Airworthiness Directives)?

1—AD's are nonregulatory in nature.
2—Noncompliance with AD's renders an airplane unairworthy.
3—Compliance with AD's is the responsibility of maintenance personnel.
4—When AD's are complied with, airplane maintenance records may be discontinued.

3031. A new maintenance record being used for a rebuilt aircraft engine must include previous

1—changes as required by Airworthiness Directives.
2—annual inspections performed on the engine.
3—operating hours of the engine.
4—operating history of the engine.

3032. Old maintenance records of an engine may be discarded when that engine is

1—top overhauled.
2—reconditioned.
3—rebuilt by the manufacturer or repair station approved by the manufacturer.
4—overhauled by the manufacturer or agency approved by the manufacturer.

3033. Aircraft maintenance records must include the current status of the

1—life-limited parts of each airframe, engine, propeller, rotors, and appliance.
2—applicable Airworthiness Certificate.
3—life-limited parts of only the engine and airframe.
4—life-limited parts of only the propeller and appliances.

3034. Which is correct concerning preventive maintenance, when accomplished by a pilot?

1—A record of preventive maintenance is not required.
2—A record of preventive maintenance must be entered in the maintenance records.
3—Records of preventive maintenance must be entered in a bound logbook.
4—Records of preventive maintenance must be kept in the aircraft.

3035. Which is true regarding the keeping of preventive maintenance records for an aircraft?

1—There is no requirement to retain these records unless the aircraft is used for hire.
2—These records are required to be kept in the aircraft maintenance logbooks.
3—There is no requirement to retain these records.
4—These records are required to be kept in some form for at least 24 calendar months.

3036. Which document should show compliance with an applicable Airworthiness Directive?

1—The aircraft maintenance records.
2—The aircraft Airworthiness Certificate.
3—A log maintained separately from other aircraft records.
4—The aircraft Registration Certificate.

3037. If an ATC transponder installed in an aircraft has not been tested, inspected, and found to comply with regulations within a specified period, what is the limitation on its use?

1—It may be used anywhere except in terminal control areas.
2—It may be used when outside controlled airspace.
3—It may be used for VFR flight but not for IFR flight.
4—Its use is not permitted.

3038. An ATC transponder is not to be used unless it has been tested, inspected, and found to comply with regulations within the preceding

1—30 days.
2—12 calendar months.
3—24 calendar months.
4—10 hours of time in service.

3039. If an alcoholic beverage is consumed by a pilot at 9 a.m., what is the earliest permissible time for that pilot to act as pilot in command of a glider?

1—3:01 p.m.
2—4:01 p.m.
3—5:01 p.m.
4—9:01 p.m.

3040. Prior to takeoff, passengers should be notified to fasten their seatbelts. This is

1—mandatory for air taxi operators and airlines only.
2—mandatory prior to takeoffs but not landings.
3—mandatory prior to all takeoffs and landings.
4—a good operating practice, although not mandatory.

3041. The use of seatbelts during takeoffs and landings is

1—required during commercial operations only.
2—a good operating practice, but not required by regulations.
3—required for all occupants.
4—required for crewmembers only.

3042. A chair–type parachute (made entirely of synthetic material) is carried in an aircraft and is available for emergency use. This parachute must have been packed by an appropriately rated parachute rigger within the preceding

1—30 days.
2—60 days.
3—90 days.
4—120 days.

3043. GIVEN:

Glider's maximum certificated operating weight.....1,040 lb.
Towline breaking strength.....3,050 lb.

Which meets the requirement for one of the safety links?

1—A safety link with a breaking strength of 822 lb. installed where the towline is attached to the towplane.
2—A safety link with a breaking strength of 2,090 lb. installed where the towline is attached to the glider.
3—A safety link with a breaking strength of 842 lb. installed where the towline is attached to the glider.
4—A safety link with a breaking strength of 2,095 lb. installed where the towline is attached to the glider.

3044. During aerotow of a glider that weighs 1,040 pounds, which towrope tensile strength would require the use of safety links at each end of the rope?

1—960 pounds.
2—1,200 pounds.
3—1,750 pounds.
4—2,450 pounds.

3045. Which is required to operate an aircraft towing an advertising banner?

1—Approval from ATC to operate in a control area.
2—A record of training in towing for the pilot in command.
3—A safety link at each end of the towline which has a breaking strength not less than 80 percent of the aircraft's gross weight.
4—A certificate of waiver issued by the Administrator.

3046. Portable electronic devices which may cause interference with the navigation or communication system may not be operated on aircraft being flown

1—in commercial operations.
2—at altitudes above 14,500 feet MSL.
3—within the United States.
4—along Federal airways.

3047. The use of certain portable electronic devices is prohibited on helicopters that are being operated under

1—IFR.
2—VFR.
3—DVFR.
4—SVFR.

3048. Considering the wind and forecast weather conditions, no person may begin a flight in an airplane at night unless there is enough fuel to fly to the first point of intended landing at normal cruising speed and after that to fly a minimum of

1—30 minutes.
2—45 minutes.
3—1 hour.
4—1 hour 15 minutes.

3049. To begin a flight in a rotorcraft under VFR, there must be enough fuel to fly to the first point of intended landing and, assuming normal cruise speed, to fly thereafter for at least

1—1 hour.
2—45 minutes.
3—30 minutes.
4—20 minutes.

3050. Within the contiguous United States, airplanes operating in which of the following are required to be equipped with a transponder having automatic altitude reporting capability?

1—Controlled airspace above 12,500 feet MSL, excluding the airspace at or below 2,500 feet AGL.
2—All controlled airspace when operating under IFR.
3—All airspace above 12,500 feet MSL, except for VFR flights.
4—All control areas when operating under IFR.

3051. A coded transponder equipped with altitude reporting equipment is required for all controlled airspace

1—except control zones.
2—above 12,500 feet MSL (excluding airspace at or below 2,500 feet AGL).
3—above 18,000 feet MSL (excluding airspace at or below 1,500 feet AGL).
4—below 14,500 feet MSL.

3052. Which of the following is required equipment for operating an airplane within a Group II TCA?

1—A 4096 code transponder with Mode C (automatic altitude reporting).
2—A VOR receiver with DME.
3—A 4096 code transponder.
4—An automatic direction finder.

3053. In addition to a two-way radio capable of communicating with ATC on appropriate frequencies, which equipment is a helicopter required to have to operate within a terminal control area? (Letter of agreement not applicable.)

1—A VOR or TACAN receiver.
2—DME, a VOR or TACAN receiver, and an appropriate transponder beacon.
3—An appropriate transponder beacon.
4—DME and a VOR or TACAN receiver.

3054. With respect to helicopter operations, which statement is true concerning ATC transponder equipment requirements?

1—Under the terms of a letter of agreement, helicopters may be operated at or below 1,000 feet AGL within Group I and II terminal control areas without an operable ATC transponder.
2—Only helicopters with a certificated gross weight of more than 12,500 pounds that are engaged in commercial operations are required to be equipped with operable ATC transponders.
3—Operable ATC transponders are required only when operating helicopters within control zones at night under special VFR.
4—Helicopters are required to be equipped with operable ATC transponders only during commercial operations above 3,000 feet AGL.

3055. In the case of an aircraft with no transponder equipment installed, how long before a proposed operation in a TCA must a request for a deviation be submitted to the ATC facility having jurisdiction over the TCA?

1—1 hour.
2—4 hours.
3—6 hours.
4—24 hours.

3056. Unless otherwise authorized, an airship being operated within a Group I Terminal Control Area is required to be equipped with an operable

1—ILS receiver and marker beacon receiver.
2—4096 radar beacon transponder with automatic altitude reporting capability.
3—ADF receiver and VOR receiver.
4—DME receiver and an emergency locator transmitter.

3057. All aircraft (except gliders) are required to be equipped with operable Mode A 4096 transponders with automatic pressure altitude reporting capability when operating in

1—controlled airspace above 12,500 feet MSL.
2—all airspace above 10,000 feet MSL.
3—controlled airspace above 10,000 feet MSL.
4—all airspace above 12,000 feet MSL that is not in the Continental Control Area.

3058. Excluding airspace at and below 2,500 feet AGL, above which altitude in controlled airspace of the contiguous United States is an appropriately equipped transponder required?

1—12,500 feet AGL.
2—12,500 feet MSL.
3—14,500 feet AGL.
4—14,500 feet MSL.

3059. In the contiguous United States, excluding the airspace at or below 2,500 feet AGL, an operable coded transponder equipped with Mode C capability is required in all controlled airspace above

1—12,500 feet MSL.
2—14,500 feet MSL.
3—FL180.
4—FL240.

3060. What is the maximum tolerance allowed for an operational VOR equipment check when using a VOT?

1—Plus or minus 2°.
2—Plus or minus 4°.
3—Plus or minus 6°.
4—Plus or minus 8°.

3061. Regarding certificates and documents, no person may operate an aircraft unless it has within it

1—a Registration Certificate, aircraft and engine logbooks, and owner's handbook.
2—an Airworthiness Certificate, Registration Certificate, and operating limitations.
3—an Airworthiness Certificate, and aircraft and engine logbooks.
4—a Registration Certificate and owner's handbook.

3062. Which is true regarding civil aircraft airworthiness?

1—If an unairworthy mechanical or structural condition exists, that aircraft can be flown only in solo flight.
2—The pilot in command is responsible for determining that the aircraft is in condition for safe flight.
3—An FAA certificated mechanic is responsible for determining that the aircraft is in condition for safe flight.
4—The commercial operator is responsible for determining that the aircraft is in condition for safe flight.

3063. Determining that an aircraft is in condition for safe flight is the sole responsibility of the

1—owner of that aircraft.
2—operator who leases that aircraft.
3—mechanic who services that aircraft.
4—pilot in command of that aircraft.

3064. Which is required equipment for powered aircraft during VFR night flights?

1—Gyroscopic bank and pitch indicator.
2—Gyroscopic direction indicator.
3—Appropriate radio navigational equipment.
4—Anticollision light system.

3065. Which is required equipment for powered aircraft during VFR night flights?

1—A landing light if the flight is for hire.
2—Two-way radio communications system.
3—Flashlight with red lens.
4—Sensitive altimeter adjustable for barometric pressure.

3066. Which is required equipment for a helicopter during VFR night flights?

1—Gyroscopic direction indicator.
2—Gyroscopic pitch and bank indicator.
3—Anticollision light system.
4—Appropriate radio navigational equipment.

3067. What equipment is required if an airplane is operated for hire on a day VFR flight conducted over water and beyond power-off gliding distance from shore?

1—An approved system of dispensing at least two different colors of water dye.
2—A sensitive altimeter adjustable for barometric pressure.
3—Approved flotation gear readily available to each occupant, and at least one pyrotechnic signaling device.
4—Approved flotation gear readily available to each occupant only if the aircraft is flown beyond 50 NM from shore.

3068. Approved flotation gear, readily available to each occupant, is required on each airplane if it is being flown for hire over water,

1—but only when beyond 50 NM from shore.
2—beyond power-off gliding distance from shore.
3—regardless of the distance flown from shore.
4—but only when beyond 25 NM from shore.

3069. Automatic pressure altitude reporting equipment associated with a radar beacon transponder must be deactivated when

1—operating VFR within terminal control areas.
2—operating within an airport traffic area.
3—directed by ATC.
4—operating VFR within a control zone.

3070. Unless authorized, a restricted category civil aircraft should not be operated within

1—transition areas.
2—control areas.
3—congested airways.
4—control zones.

3071. Which is true with respect to operating limitations of a restricted category helicopter?

1—A pilot of a restricted category helicopter is required to hold a commercial pilot certificate.
2—A restricted category helicopter is limited to an operating radius of 25 miles from its home base.
3—No person may operate a restricted category helicopter carrying property or passengers for compensation or hire.
4—Under no circumstances may a restricted category helicopter be operated over a densely populated area.

3072. A certificated commercial pilot is permitted to carry persons or property for compensation or hire in which category of aircraft?

1—Restricted category aircraft.
2—Limited category aircraft.
3—Utility category aircraft.
4—Restricted, limited, and utility category aircraft.

3073. A limited category helicopter may not be operated

1—to carry persons or property for compensation.
2—beyond a radius of 25 miles from its home base.
3—over a densely populated area.
4—within controlled airspace.

3074. The carriage of passengers for hire by a commercial pilot is

1—authorized in experimental category aircraft.
2—not authorized in utility category aircraft.
3—not authorized in limited category aircraft.
4—authorized in restricted category aircraft.

3075. The carriage of passengers for hire in a free balloon piloted by a commercial pilot is

1—not authorized in an experimental category balloon.
2—not authorized in a foreign civil balloon.
3—authorized in a restricted category balloon.
4—authorized in a limited category balloon.

3076. Which person is directly responsible for the pre-launch briefing of passengers for a balloon flight?

1—Safety officer.
2—Crew chief.
3—Pilot in command.
4—Ground crewmember designated by the balloon commander.

3077. Familiarization with all available weather reports and forecasts, fuel requirements, and alternatives available is required by regulations

1—for all flights not in the vicinity of an airport.
2—only if passengers are carried for hire.
3—only if the flight is conducted outside controlled airspace.
4—only if the flight is conducted within controlled airspace.

3078. The required preflight action relative to alternatives available if the planned flight cannot be completed, is applicable to

1—IFR flights only.
2—any flight conducted for hire or compensation.
3—any flight not in the vicinity of an airport.
4—all IFR and night VFR flights.

3079. Required flight crewmembers' seatbelts must be fastened

1—while the crewmembers are at their stations.
2—only during takeoff and landing when passengers are aboard the aircraft.
3—at all times while the aircraft is being operated in clouds.
4—only during takeoff and landing.

3080. FAR Part 135, governing air taxi operators and commercial operators of small aircraft, applies to which operation?

1—Carrying weekend skiers for hire to another state.
2—A pipeline patrol flown by a commercial pilot hired by the company which owns both the pipeline and airplane.
3—Student instruction for hire at an approved school.
4—Aerial work including crop dusting and spraying.

3081. When operating an airplane with a maximum payload capacity of 7,500 pounds or less as a commercial operator (not an air carrier) in common carriage solely between points within a state, the operation is governed by the provisions of

1—FAR Part 91.
2—FAR Part 121.
3—FAR Part 129.
4—FAR Part 135.

3082. Which of the following situations is an example of private carriage by a commercial operator?

1—An operator who uses agents or salesmen to obtain passengers from the general public rather than through the use of signs and advertising.
2—Carriage of selected customers, generally on a long-term basis, where there is no advertising to the public.
3—A carrier holding itself out as generally willing to carry only certain kinds of traffic.
4—Any offer to the public to carry individuals or property free, but where a nominal charge is paid by the customer.

3083. An aircraft may be operated in a foreign country by an FAR Part 135 operator only if authorized to do so by

1—an FAA International Field Office.
2—the International Civil Aviation Organization.
3—the foreign country.
4—the U.S. State Department.

3084. Which statement best defines the term holding out?

1—Carriage of property for hire for one customer in intrastate commerce.
2—Offers to the public the carriage of persons and property for hire either intrastate or interstate.
3—Carriage of persons or property for hire for a few selected customers on an intrastate basis.
4—Carriage of cargo for an industrial firm on an intrastate basis.

3085. FAR Part 135, applies to which operation?

1—Commercial operations (not an air carrier) in an aircraft with less than 20 passenger seats.
2—Aerial operations for compensation, such as aerial photography, pipeline patrol, rescue, and crop dusting.
3—Civil aircraft being ferried to a foreign country.
4—Flight instruction conducted by an FAA-approved flight school.

3086. Who is responsible for keeping copies of the ATCO manual up-to-date with approved changes or additions?

1—Supervising FAA district offices.
2—Each employee of the certificate holder who is furnished a manual.
3—Air Taxi/Commercial Technical Service.
4—A representative of the Administrator assigned to the certificate holder.

3087. Which document contains procedures that explain how the pilot in command knows that the required return-to-service conditions have been met?

1—Certificate holder's manual.
2—Mechanical interruption summary report.
3—Daily flight log.
4—Operations inspections and surveillance procedures handbook.

3088. Which document specifically authorizes a person to operate an aircraft in a particular geographic area?

1—Letter of authorization.
2—Certificate of designation.
3—Air taxi operating certificate.
4—Operations specifications.

3089. What restrictions must be observed regarding the carrying of cargo in the passenger compartment?

1—Cargo must be properly secured by a seatbelt or other approved tiedown.
2—Cargo must be separated from seated passengers by a partition capable of withstanding specified stresses.
3—All cargo must be carried in a suitable bin and secured to the floor structure of the airplane.
4—Cargo carried in the passenger seats must be forward of all passengers.

3090. Which is a requirement governing the carriage of carry-on baggage?

1—All carry-on baggage must be restrained so that its movement is prevented during turbulence.
2—Any piece of carry-on baggage, regardless of size, must be properly secured by a seatbelt or tiedown device.
3—Carry-on baggage must be stowed ahead of all seated occupants.
4—Pieces of carry-on baggage weighing more than 10 pounds must be carried in an approved rack or bin.

3091. The airplane flight manual specifies a maximum altitude loss of 75 feet for malfunction of the autopilot under cruise conditions. What is the lowest altitude above the terrain the autopilot may be used during en route operations?

1—575 feet.
2—650 feet.
3—1,000 feet.
4—500 feet.

3092. A second in command is required in all airplanes

1—having a passenger seating configuration of more than nine seats.
2—being operated in commuter air carrier service.
3—powered by turbine engines.
4—having a total seating capacity of nine seats or more and being operated in commuter air carrier service.

3093. A commuter air carrier certificate holder plans to assign a pilot as pilot in command of an airplane to be used in passenger-carrying operations. Which experience requirement must that pilot meet if the airplane is to be flown with an autopilot and no second in command?

1—75 hours and 20 landings in type.
2—100 hours as pilot in command in the make and model.
3—100 hours in the category, class, and type.
4—50 hours and 10 landings as pilot in command in the make and model.

3094. Which person may be carried aboard an aircraft without complying with the passenger-carrying requirements of FAR Part 135?

1—An authorized technical representative of an aircraft or engine company.
2—A member of the United States diplomatic corps on an official courier mission.
3—A political candidate campaigning for Federal office.
4—An individual who is necessary for the safe handling of animals on the aircraft.

3095. In which airplanes is a flight attendant crewmember required?

1—Any airplane being operated in commuter air carrier service.
2—Airplanes having a passenger seating configuration, excluding any pilot seat, of 10 or more.
3—All turbine-engine-powered airplanes having a total seating capacity of 19 or more.
4—Any airplane having a passenger seating configuration, excluding any pilot seat, of 20 or more.

3096. The oral preflight briefing required on passenger-carrying airplanes shall be

1—supplemented by an actual demonstration of emergency exit door operation by a crewmember.
2—presented in person by the pilot in command while another flight crewmember demonstrates the operation of emergency equipment.
3—conducted by the pilot in command or a crewmember and supplemented by printed cards for the use of each passenger.
4—supplemented by a demonstration of the location of emergency equipment, and if the flight is to be at or above 10,000 feet MSL, the use of oxygen.

3097. In which aircraft, operating under FAR Part 135, is a third gyroscopic pitch-and-bank indicator required?

1—All transport category airplanes.
2—All turbojet airplanes.
3—All airplanes where a flightcrew of pilot in command and second in command is required.
4—All airplanes having a passenger seating capacity of 30 seats or more.

3098. For which airplanes must each flight crewmember station have a shoulder harness installed?

1—All airplanes operated in commuter air carrier service.
2—All airplanes having a passenger seating configuration, excluding any pilot seat, of 10 seats or more.
3—Any airplane being operated under FAR Part 135, regardless of weight and seating configuration.
4—Any airplane powered by a reciprocating or turbine engine, if it has a passenger seating configuration of eight seats or more.

3099. The NTSB Regulation requires an immediate notification as a result of which incident?

1—Any required flight crewmember being unable to perform flight duties because of illness.
2—Engine failure for any reason during flight.
3—Damage to the landing gear as a result of a hard landing.
4—Generator failure in flight which results in the loss of the electrical system.

3100. Which incident would require that the nearest NTSB field office be notified immediately?

1—Damage to the landing gear.
2—In-flight generator/alternator failure.
3—In-flight fire.
4—In-flight navigation radio failure.

3101. While taxiing for takeoff, a small fire burned the insulation from a tranceiver wire. What action would be required to comply with NTSB Regulation Part 830?

1—An immediate report must be filed with the nearest FAA field office.
2—No notification or report is required.
3—An immediate notification must be filed by the operator of the aircraft with the nearest NTSB field office.
4—A notification must be filed only if requested by the NTSB.

3102. Notification to the NTSB is required when there has been any damage

1—caused by collision with another aircraft on the ground.
2—to an engine caused by engine failure in flight.
3—which adversely affects structural strength or flight characteristics.
4—which requires repairs to landing gear or flaps.

3103. During flight, a fire which was extinguished, burned the insulation from a transceiver wire. What action is required by regulations?

1—An immediate landing at the most practical airport and an immediate notification filed with the nearest FAA field office.
2—No notification or report is required.
3—An immediate notification by the operator of the aircraft to the nearest NTSB field office.
4—A notification only if requested by the NTSB.

3104. When should notification of an aircraft accident be made to the NTSB if there was substantial damage and no injuries?

1—Immediately.
2—Within 10 days.
3—Within 30 days.
4—Within 15 days.

3105. The operator of an aircraft that has been involved in an incident is required to submit a report to the nearest field office of the NTSB

1—within 3 days.
2—within 10 days.
3—within 7 days.
4—only if requested to do so.

3106. Within how many days of an accident is an accident report required to be filed with the nearest NTSB field office?

1—2 days.
2—4 days.
3—7 days.
4—10 days.

3107. An applicant for a commercial pilot certificate with an airplane rating who does not hold an instrument rating (airplane), will have his/her certificate endorsed with a limitation prohibiting which operation(s) at the time that certificate is issued?

1—The carriage of passengers for hire in airplanes for all flights unless a second in command is on board.
2—The carriage of passengers for hire in airplanes on cross-country flights of more than 50 NM, or at night.
3—The carriage of passengers or property for hire in controlled airspace.
4—The carriage of passengers for hire in airplanes on cross-country flights only if the distance from the point of departure to destination exceeds 250 NM.

3108. What is the minimum age for a person to be issued a student pilot certificate limited to free balloons?

1—14 years of age.
2—15 years of age.
3—16 years of age.
4—18 years of age.

3109. To operate a balloon in solo flight, a student pilot must have a logbook endorsement by an authorized instructor within the preceding

1—30 days.
2—60 days.
3—90 days.
4—6 months.

3110. To exercise the privileges of a commercial pilot certificate with a lighter-than-air, free balloon rating, the minimum medical requirement is a

1—Second-Class Medical Certificate when carrying passengers for hire.
2—statement by the pilot certifying he/she has no known medical deficiency that would make him/her unable to act as pilot.
3—statement from any designated medical examiner certifying the pilot has no medical deficiencies.
4—Third-Class Medical Certificate.

3111. A commercial pilot who gives flight or ground instruction in a balloon must keep a record of such instruction for a period of

1—1 year.
2—2 years.
3—3 years.
4—5 years.

3112. What is the maximum amount of flight instruction an authorized instructor may give in any 24 consecutive hours?

1—4 hours.
2—6 hours.
3—8 hours.
4—10 hours.

3113. What limitation is imposed on a newly certificated commercial airplane pilot if that person does not hold an instrument pilot rating?

1—That person is limited to private pilot privileges.
2—The carrying of passengers or property for hire on cross-country flights at night is limited to a radius of 50 NM.
3—The carrying of passengers for hire on cross-country flights is limited to 50 NM and the carrying of passengers for hire at night is prohibited.
4—The carrying of passengers for hire on cross-country flights is limited to 50 NM for night flights, but not limited for day flights.

3114. What flight time may a pilot log as second in command?

1—All flight time while acting as second in command regardless of aircraft crew requirements.
2—All flight time while acting as second in command in an aircraft requiring more than one pilot.
3—Only that flight time during which the second in command is the sole manipulator of the controls.
4—One-half of the total flight time while serving as second in command on aircraft requiring more than one pilot.

3115. A person exercising the privileges of a commercial pilot certificate must show by a reliable record, the logging of which flight time?

1—The flight instruction time received.
2—The flight time necessary to meet the recent experience requirements.
3—All flight time flown with passengers aboard.
4—All flight time.

3116. What flight time must be shown, in a reliable record, by a pilot exercising the privileges of a commercial pilot certificate?

1—All additional flight time.
2—All flight time flown with passengers aboard the aircraft.
3—Only the flight time necessary to meet the recent experience requirements.
4—Only the additional flight instruction time received.

3117. To serve as second in command of large airplanes, a person must hold at least

1—a private pilot certificate with appropriate category and class ratings.
2—a commercial pilot certificate with the appropriate category, class, and type ratings.
3—a commercial pilot certificate, an appropriate instrument rating, and be type-certificated in the airplane.
4—an airline transport pilot certificate with the appropriate category and type ratings.

3118. If a pilot does not meet the recency of experience requirements for night flight and official sunset is 1800 CST, the latest time passengers should be carried is

1—1700 CST.
2—1800 CST.
3—1830 CST.
4—1900 CST.

3119. To act as pilot in command of an aircraft carrying passengers at night, a pilot is required to have made at least

1—three takeoffs and three landings, either full stop or touch-and-go, at night within the preceding 120 days, accompanied by a certificated flight instructor who meets the recent experience for night flight.
2—three takeoffs and three landings to a full stop at night, within the preceding 90 days, in the same category and class of aircraft to be used.
3—three takeoffs and three landings to a full stop at night, within the preceding 90 days, in any category and class of aircraft.
4—three touch-and-go landings at night, within the preceding 120 days, in the same category and class of aircraft to be used.

3120. A student pilot may not operate a balloon in initial solo flight unless that pilot

1—has a valid Student Pilot Certificate endorsed by an authorized instructor.
2—holds a valid Student Pilot Certificate and a current Third-Class Medical Certificate.
3—has received a minimum of 5 hours' dual instruction in a balloon.
4—has made at least 10 free balloon flights under the supervision of an authorized instructor.

3121. Which are considered aircraft class ratings?

1—Single-engine land, multiengine land, single-engine sea, and multiengine sea.
2—Standard, restricted, experimental, and limited.
3—Transport, normal, utility, and acrobatic.
4—Airplane, rotorcraft, glider, and lighter-than-air.

3122. The term category as used with respect to certification, privileges, and limitations of airmen, include

1—free balloon, single-engine, multiengine, land, and sea.
2—lighter-than-air, airplane, rotorcraft, and glider.
3—normal, utility, restricted, and transport.
4—AX-6, Cessna 150, DC-9, and Lear Jet.

3123. Does a commercial pilot certificate have a specific expiration date?

1—No, it is issued without an expiration date.
2—Yes, it expires at the end of the 12th month after the month in which it was issued.
3—Yes, it expires at the end of the 24th month after the month in which it was issued.
4—No, but commercial privileges expire if a flight review is not satisfactorily completed each 12 months.

3124. A Second-Class Medical Certificate issued to a commercial pilot on April 10, this year, permits the pilot to exercise which privileges?

1—Commercial pilot privileges through April 30, next year.
2—Commercial pilot privileges through April 10, 2 years later.
3—Private pilot privileges through, but not after, March 31, next year.
4—Private pilot privileges through, but not after, April 10, 2 years later.

3125. If a Second-Class Medical Certificate was issued to a commercial pilot 13 months ago, during the next 11 months, this pilot may

1—act as pilot in command and carry passengers or property, but not for compensation or hire.
2—act as pilot in command for compensation or hire and carry passengers or property for compensation or hire.
3—not act as pilot in command nor carry passengers or property.
4—act as pilot in command for compensation or hire, but may not carry passengers or property for compensation or hire.

3126. What is the earliest date a Second-Class Medical Certificate could have been issued to exercise the privileges of a commercial pilot certificate on December 11 of this year?

1—December 31 of last year.
2—December 11 of last year.
3—December 1 of last year.
4—November 31 of last year.

3127. A current and appropriate pilot and medical certificate are required to be in a pilot's personal possession only when

1—acting as pilot in command or a required flight crewmember.
2—carrying passengers.
3—operating for compensation or hire.
4—operating in controlled airspace.

3128. Commercial pilots are required to have a current and appropriate pilot certificate in their personal possession when

1—carrying passengers only.
2—acting as pilot in command.
3—piloting for hire only.
4—operating in controlled airspace only.

3129. The medical requirement to exercise the privileges of a Commercial Pilot Certificate with a glider rating is at least

1—a valid Second-Class Medical Certificate.
2—a statement by the pilot certifying that he/she has no known medical deficiency that makes him/her unable to pilot a glider.
3—a valid Third-Class Medical Certificate.
4—a medical statement from a designated medical examiner on file with the nearest FAA district office.

3130. A Second-Class Medical Certificate issued March 6 of this year will

1—be issued without a specific expiration date if there are no limitations that would affect the safe operations of an aircraft.
2—expire March 6 of the next year.
3—expire March 31 of the next year for commercial pilot privileges.
4—expire March 6, 2 years later for commercial pilot privileges.

3131. When is the pilot in command required to hold a category and class rating appropriate to the aircraft being flown?

1—Flight tests given by the FAA.
2—All solo flights.
3—Flights for compensation or hire.
4—All flights.

3132. The pilot in command is required to hold a type rating when operating any

1—turbojet-powered airplane.
2—airplane which is used for commercial purposes.
3—airplane which has a gross weight of 6,000 pounds or more.
4—multiengine airplane which is operated under interstate commerce.

3133. Unless otherwise authorized, the pilot in command is required to hold a type rating when operating any

1—aircraft that is certificated for more than one pilot.
2—airplane having a gross weight of more than 12,500 pounds.
3—multiengine airplane having a gross weight of more than 6,000 pounds.
4—airplane operated in interstate commerce.

3134. To act as pilot in command of an airplane that is equipped with a retractable landing gear, if no pilot-in-command time in such an airplane was logged prior to November 1, 1973, a person is required to

1—receive flight instruction in such an airplane and obtain a logbook endorsement of competency.
2—hold a retractable-gear airplane class rating.
3—make at least three solo takeoffs and landings in such an airplane.
4—pass an FAA flight test in such an airplane.

3135. Prior to carrying passengers at night, the pilot in command must have accomplished the required takeoffs and landings in

1—an aircraft that is equipped for instrument flight.
2—the same category and class of aircraft to be used.
3—the same category, class, and type of aircraft to be used.
4—any category aircraft.

3136. To act as pilot in command of an aircraft carrying passengers at night, the pilot must have made within the preceding 90 days at least

1—three takeoffs and three landings to a full stop at night in an aircraft of the same category and class.
2—three takeoffs and three landings to a full stop at night in an aircraft of the same category only.
3—five takeoffs and five landings to a full stop at night in an aircraft of the same category and class.
4—five takeoffs and five landings to a full stop at night in an aircraft of the same category only.

3137. To act as pilot in command of a gyroplane carrying passengers, three takeoffs and three landings must have been made in a gyroplane within the preceding

1—6 months.
2—90 days.
3—60 days.
4—30 days.

3138. A commercial pilot who has not satisfactorily accomplished a flight review or proficiency check within the preceding 24 months may

1—operate an aircraft in solo flight only.
2—not act as pilot in command of any aircraft.
3—act as pilot in command, but not for compensation or hire.
4—act as pilot in command if the flight remains within 50 NM of the departure airport.

3139. To act as pilot in command of an aircraft, a pilot must have satisfactorily accomplished a flight review or completed a proficiency check within the preceding

1—6 months.
2—12 months.
3—24 months.
4—36 months.

3140. Unless the necessary takeoffs and landings have been made to meet the recency of experience requirement, a commercial pilot may not

1—perform any duties as a crewmember.
2—fly for compensation or hire.
3—act as pilot in command.
4—carry passengers.

3141. Unless the takeoffs and landings to meet the recency of experience requirement have been made, a commercial pilot may not

1—fly a balloon for compensation or hire.
2—fly a balloon with passengers aboard.
3—act as pilot in command.
4—perform any duties as a crewmember.

3142. What recent flight experience must be met before a commercial airplane pilot may fly solo in an airplane?

1—Three takeoffs and three landings within the preceding 90 days in an airplane.
2—Three takeoffs and three landings within the preceding 90 days in any fixed-wing aircraft.
3—Satisfactorily accomplished a flight review in any aircraft for which rated, within the preceding 24 months.
4—Satisfactorily accomplished a flight review within the preceding 24 months, but this review must be in an airplane.

3143. What recent flight experience requirements must be met before a commercial pilot may fly solo in a glider?

1—Satisfactorily accomplished a flight review or proficiency check, within the preceding 24 months, in any aircraft for which rated.
2—Three takeoffs and three landings within the preceding 90 days in any fixed-wing aircraft.
3—Three takeoffs and three landings within the preceding 90 days in a glider.
4—Satisfactorily accomplished a flight review within the preceding 24 months and this review must be in a glider.

3144. Prior to flying a helicopter solo, a pilot who holds a Commercial Pilot Certificate with an appropriate class rating must meet which of the following requirements?

1—Hold an instrument rating.
2—Hold a Second-Class Medical Certificate issued within the preceding 12 months.
3—Satisfactorily complete a flight review or proficiency check within the preceding 24 months.
4—Accomplish three takeoffs and three landings within the preceding 90 days.

3145. Before acting as pilot in command of a helicopter with passengers aboard, a pilot is required to have

1—logged at least 3 hours of flight time as pilot in command of a helicopter within the preceding 6 months.
2—logged at least 6 hours of flight time as pilot in command of a helicopter within the preceding 12 months.
3—completed at least three takeoffs and three landings and have logged at least 3 hours of flight time as pilot in command of a helicopter within the preceding 90 days.
4—completed at least three takeoffs and three landings in a helicopter within the preceding 90 days.

3146. Prior to flying an airship solo, a pilot who holds a Commercial Pilot Certificate with an appropriate class rating must meet which requirement?

1—Accomplish three takeoffs and landings within the preceding 90 days.
2—Hold an instrument rating.
3—Hold a Second-Class Medical Certificate issued within the preceding 12 months.
4—Satisfactorily completed a flight review or proficiency check within the preceding 24 months.

3147. No pilot may act as pilot in command of an airship under IFR nor in weather conditions less than the minimums prescribed for VFR unless that pilot has, within the past 6 months, completed at least

1—six instrument flights under actual IFR conditions.
2—three instrument approaches and logged 3 hours.
3—six instrument approaches and logged 6 hours instrument time, or passed an instrument competency check in an airship.
4—an instrument flight review with an appropriately rated instructor.

3148. To meet the recent flight experience requirements to act as pilot in command of a free balloon carrying passengers, the pilot must have logged within the preceding 90 days at least

1—three takeoffs and three landings in a balloon.
2—five takeoffs and five landings in a balloon.
3—three takeoffs and three landings in any lighter-than-air aircraft.
4—five takeoffs and five landings in any lighter-than-air aircraft.

3149. To act as pilot in command of a balloon, the pilot must have satisfactorily completed a pilot proficiency check or flight review within the preceding

1—6 months.
2—12 months.
3—18 months.
4—24 months.

3150. Pilots who change their permanent mailing address and fail to notify the FAA Airmen Certification Branch of this change, are entitled to exercise the privileges of their pilot certificate for a period of

1—30 days.
2—60 days.
3—90 days.
4—180 days.

3151. To act as pilot in command of an airplane towing a glider, a certificated airplane pilot is required to have

1—a logbook endorsement for receipt of ground and flight instruction in gliders and familiarity with techniques and procedures for glider towing.
2—at least a Private Pilot Certificate with a glider rating and made and logged at least three flights as pilot or observer in a glider being towed by an airplane.
3—a logbook record of having made at least three flights as sole manipulator of the controls of a glider being towed by an airplane.
4—at least a Commercial Pilot Certificate with a glider rating.

3152. To act as pilot in command of an airplane towing a glider, the tow pilot is required to have a pilot certificate and

1—at least a private pilot glider rating.
2—a logbook record of having made at least three flights in a glider.
3—a commercial pilot glider rating.
4—have received and logged ground and flight instruction in gliders, and be familiar with the techniques and procedures essential for safe towing of gliders.

3153. In accordance with FAR Part 135, what period of time is the minimum flightcrew required to use supplemental oxygen while cruising at 13,500 feet MSL for 2 hours 45 minutes in an unpressurized aircraft?

1—1 hour 45 minutes.
2—2 hours.
3—2 hours 15 minutes.
4—2 hours 45 minutes.

3154. In accordance with FAR Part 91, above which cabin pressure altitude must the required minimum flightcrew use supplemental oxygen at all times?

1—10,000 feet MSL.
2—12,000 feet MSL.
3—12,500 feet MSL.
4—14,000 feet MSL.

3155. In accordance with FAR Part 135, what use of supplemental oxygen is required, if any, of a pilot if cruising at 12,500 feet MSL in an unpressurized aircraft?

1—Supplemental oxygen is required for that portion of the flight that is more than 30 minutes' duration while at that altitude.
2—Supplemental oxygen is to be used during the entire flight while at that altitude.
3—Supplemental oxygen is required for that portion of the flight that is more than 60 minutes' duration while at that altitude.
4—Supplemental oxygen is not required at that altitude.

3156. If operating under FAR Part 91, above which cabin pressure altitude must each occupant of an aircraft be provided with supplemental oxygen?

1—10,000 feet MSL.
2—12,500 feet MSL.
3—14,000 feet MSL.
4—15,000 feet MSL.

3157. Glider pilots should use supplemental oxygen during the entire time when flying above what altitude?

1—5,000 feet MSL.
2—8,000 feet MSL.
3—10,000 feet MSL.
4—14,000 feet MSL.

3158. In accordance with FAR Part 91, supplemental oxygen must be used by the required minimum flightcrew for that time exceeding 30 minutes while at cabin pressure altitudes above

1—10,000 feet MSL.
2—10,500 feet MSL.
3—12,000 feet MSL.
4—12,500 feet MSL.

3159. What are the oxygen requirements when operating above 15,000 feet MSL in a free balloon?

1—Oxygen is required for the flightcrew only for that portion of the flight which exceeds 30 minutes.
2—Oxygen is not required at any altitude in a free balloon.
3—The flightcrew must use and passengers must be provided oxygen.
4—Oxygen must be available for the flightcrew.

3160. In accordance with FAR Part 91, what period of time will the minimum required flightcrew have to use supplemental oxygen while cruising at 13,500 feet MSL for 1 hour 45 minutes in an unpressurized aircraft?

1—45 minutes.
2—1 hour.
3—1 hour 15 minutes.
4—1 hour 45 minutes.

3161. What is the highest altitude a pilot may fly an unpressurized aircraft under FAR Part 135 without using supplemental oxygen?

1—10,000 feet MSL.
2—12,000 feet MSL.
3—12,500 feet MSL.
4—15,000 feet MSL.

3162. An aircraft cruising at FL200 is pressurized to 4.2 psid (differential pressure). What is the approximate cabin pressure altitude? (See Figure 59.)

1—6,000 feet.
2—7,500 feet.
3—8,500 feet.
4—10,000 feet.

3163. An aircraft cruising at FL260 is pressurized to 4.2 psid (differential pressure). What is the approximate cabin pressure altitude? (See Figure 59.)

1—8,000 feet.
2—10,000 feet.
3—12,000 feet.
4—14,000 feet.

3164. An aircraft cruising at FL210 is pressurized to 4.2 psid (differential pressure). What is the approximate cabin pressure altitude? (See Figure 59.)

1—6,000 feet.
2—7,500 feet.
3—8,500 feet.
4—10,000 feet.

3165. An aircraft cruising at FL240 is pressurized to 4.0 psid (differential pressure). What is the approximate cabin pressure altitude? (See Figure 59.)

1—8,000 feet.
2—9,000 feet.
3—10,000 feet.
4—11,000 feet.

3166. What precautions should be used with respect to oxygen systems?

1—Do not use grease covered hands, rags, or tools near oxygen equipment.
2—Assure that medical oxygen has been used to replenish oxygen containers.
3—An approved flame dispenser with shield should be used in checking the oxygen system for leaks.
4—Prohibit smoking while in an aircraft equipped with an oxygen system.

3167. If decompression occurs in a pressurized airplane, a pilot should

1—make a rapid descent to an appropriate lower altitude.
2—start a slow descent to a lower altitude to minimize passenger discomfort.
3—contact ATC on 121.5 MHz for permission to descend.
4—instruct each passenger to force air into the middle ear.

3168. At a cabin pressure altitude of 20,000 feet, the ability of a pilot to take corrective and protective action is lost due to hypoxia in what time span?

1—5 to 12 minutes.
2—15 to 20 minutes.
3—20 to 30 minutes.
4—1 to 2 hours.

STANDARD ATMOSPHERIC PRESSURES

ALTITUDE (FT.)	PRESSURE (PSI)	ALTITUDE (FT.)	PRESSURE (PSI)
Sea Level	14.7	16,000	8.0
2,000	13.7	18,000	7.3
4,000	12.7	20,000	6.8
6,000	10.9	24,000	5.7
10,000	10.1	26,000	5.2
12,000	9.4	28,000	4.8
14,000	8.6	30,000	4.4

Courtesy of Cessna Aircraft Company

For Testing Purposes Only

Figure 59

3169. An aircraft configured for air ambulance operations should include

1—shoulder harness for all passenger seats.
2—four-point floor anchor points and approved web-type restraints for securing stretchers.
3—a seat near the patient for an attendant.
4—a nitrous oxide supply and breathing mask for in-flight patient sedation.

3170. What precaution should be taken if dry ice is carried aboard an aircraft?

1—This material does not require special precautions.
2—An extra fire extinguisher should be carried.
3—A waiver to carry this material should be requested from the certificating FAA district office.
4—Proper ventilation of the aircraft should be assured.

3171. Which would most likely result from hyperventilation?

1—Insufficient carbon dioxide.
2—Excessive carbon monoxide.
3—Insufficient oxygen.
4—Excessive carbon dioxide.

3172. When rapid decompression occurs above 30,000 feet in a pressurized airplane, what is the pilot's average time of useful consciousness without oxygen and why?

1—1 minute, because of the bends.
2—1/2 second, because of severe lung damage.
3—30 seconds, because of hypoxia.
4—3 minutes, because of impaired vision.

3173. Which physiological condition normally encountered during flight should a pilot be able to overcome through practice and experience?

1—Aerosinusitis.
2—Aerotitis.
3—Hypoxia.
4—Spatial disorientation.

3174. The shortage of oxygen in the human body results in which condition?

1—Hypoxia.
2—Aerosinusitis.
3—Aerotitis.
4—Hyperventilation.

3175. Which of the following situations will likely result in Coriolis illusion leading to spatial disorientation?

1—Rapid acceleration during the initial takeoff climb.
2—An abrupt head movement while in a prolonged constant-rate turn.
3—A dark night scene spread with ground lights and stars such that the horizon cannot be discerned.
4—A rapid deceleration caused by a quick reduction of the throttle.

3176. Which statement concerning hypoxia is true?

1—It is possible to predict exactly when and at what flight level hypoxia will occur, and how it will manifest itself.
2—Tingling of the skin and a false sense of security may be symptoms of hypoxia.
3—Hypoxia is caused by nitrogen bubbles in the joints and bloodstream.
4—Forcing oneself to concentrate on the flight instruments will help to overcome the effects of hypoxia.

3177. Which statement concerning the use of cockpit lighting at night is correct?

1—Reducing the lighting intensity to a minimum level will eliminate blind spots.
2—The use of regular white light, such as a flashlight, will impair night adaptation.
3—Coloration shown on maps is least affected by the use of direct red lighting.
4—When flying near thunderstorms having numerous lightning flashes, instrument lighting intensity should be reduced.

3178. The most effective visual scanning technique to use for detecting other aircraft at night is to

1—turn the head and sweep the eyes rapidly over the entire visible region.
2—avoid staring directly at the point where another aircraft is suspected to be flying.
3—avoid scanning the region below the horizon so as to avoid the effect of ground lights on the eyes.
4—stare directly at the point where another aircraft is suspected to be flying.

3179. Why is medical oxygen not recommended for use as supplemental oxygen in aircraft?

1—It is too dry and could cause irritation on the lungs.
2—It contains medicinal properties that may have adverse effects at altitude.
3—It is available only in high-pressure cylinders which are dangerous in aircraft.
4—It may contain moisture, which could freeze.

3180. If exhaust fumes are detected in the cockpit, the pilot should

1—shut down the engine and land immediately.
2—shut off the cabin heater and close all openings to the engine compartment.
3—open all cabin vents including passages to the engine compartment.
4—avoid inhaling 100 percent oxygen.

3181. Susceptibility to carbon monoxide poisoning increases as

1—altitude increases.
2—altitude decreases.
3—air pressure increases.
4—humidity of the air decreases.

3182. Which is true regarding carbon monoxide?

1—Headaches, drowsiness, or dizziness are symptoms of carbon monoxide poisoning.
2—An increase in altitude decreases the adverse effect/influence of carbon monoxide.
3—A small quantity of carbon monoxide is harmless.
4—Carbon monoxide forces oxygen to be attached to the hemoglobin.

3183. Which statement is true regarding the presence of alcohol within the human body?

1—A small amount of alcohol increases vision acuity.
2—An increase in altitude decreases the adverse effect of alcohol.
3—Judgment and decision-making abilities can be adversely affected by even small amounts of alcohol.
4—The human body metabolizes alcohol at a faster rate if bolstered with coffee.

3184. Rapid or extra deep breathing can cause a condition known as

1—hypoxia.
2—aerosinusitis.
3—aerotitis.
4—hyperventilation.

3185. To ensure proper habits and correct techniques during training, an instructor should

1—use the building block technique of instruction.
2—introduce tasks which are difficult and challenging to the student.
3—always repeat subject matter the student has already learned.
4—expose the student to complex operations early in training to ensure basic tasks are being learned.

3186. The instructor can counteract anxiety in a student by

1—treating the student's fears as normal reaction.
2—ignoring the student's fears.
3—continuously citing the unhappy consequences of faulty performance.
4—discontinuing instruction in the tasks that cause anxiety.

3187. Which of these learning experiences would be the most effective in the learning process?

1—Those in which the student need only commit something to memory.
2—Experiences which involve the student's feelings, thoughts, and memories of past experiences.
3—Experiences which are totally new and unrelated to the learner's previous experiences.
4—Those which present a minimum challenge to the student.

3188. To answer a student's question, it is most important that the instructor

1—have complete knowledge of the subject.
2—keep specifics to a minimum.
3—risk a guess rather than admit ignorance.
4—clearly understand the question.

3189. If a student asks a question which the instructor cannot answer, the instructor should

1—tell the student to reintroduce the question later, to allow time for the instructor to research the answer.
2—inform the student the question is irrelevant and not pertinent to the subject being covered.
3—admit not knowing the answer and promise to get the answer or help find the answer.
4—tell the student to find the answer in available references.

3190. At the beginning of the student's training and before each flight lesson during early dual instruction, the instructor should

1—avoid terms and phrases which are part of the language of aviation, since they are new and strange to the student.
2—define the terms and phrases which will be used during the forthcoming lesson.
3—use colloquial expressions of aviation frequently so the student can learn the language of aviation.
4—use picturesque expressions to brighten the instruction given.

3191. What is the proper sequence in which the instructor should employ the four basic steps in the teaching process?

1—Explanation, trial and practice, evaluation, and review.
2—Presentation, trial and practice, evaluation, and review.
3—Explanation, demonstration, practice, and evaluation.
4—Preparation, presentation, application, and review and evaluation.

3192. A person who has learned by rote is one who

1—can repeat back something which has been taught, without being able to understand what has been learned.
2—understands what has been taught.
3—has achieved the skill to apply what has been taught.
4—is able to associate an element which has been learned with other segments of learning.

3193. Faulty performance due to student overconfidence should be corrected by

1—requiring the student to perform unpleasant tasks.
2—withholding the evaluation of the student's progress.
3—praising the student only when it is deserved.
4—raising the standard of performance for each lesson.

3194. Which is true regarding effective communication during student instruction?

1—Effective communication has taken place when information is provided in such a way that it changes the behavior of the student.
2—Effective communication has taken place when the student is able to repeat the information that has been received.
3—Effective communication is when the student has accurately received the information even though the factors and principles are not yet understood.
4—Effective communication at its best is when information is accurately transmitted and received.

3195. A leveling-off process or learning plateau in a student's progress is considered

1—normal and should be expected after an initial period of rapid improvement.
2—abnormal since it means that learning has ceased.
3—abnormal and should not be brought to the student's attention.
4—normal if it does not stay level for significant periods of effort.

3196. Motivations in the form of reproof and threats should be avoided with all but the student who is

1—timid and shy.
2—overconfident and impulsive.
3—bored or disinterested.
4—slow or discouraged.

3197. Which is true about an instructor's critique of a student's performance?

1—It is a step in the learning process, not in the grading process.
2—The critique should be subjective rather than objective in nature.
3—By its nature, a critique is necessarily negative in content.
4—The instructor's comments and recommendations should be general rather than specific.

3198. An instructor's critique of a student's performance should

1—identify only the faults and weaknesses.
2—treat every aspect of the performance in detail.
3—clearly express what was done well, what was done poorly, and how to improve the performance.
4—be conducted only in private.

3199. The highest level of learning has been achieved when a person is able to

1—accurately repeat verbally what has been learned.
2—accomplish or perform each element of a procedure precisely.
3—understand each segment of a particular subject, procedure, or technique.
4—correlate an element which has been learned with other segments or blocks of learning or accomplishments.

3200. The dominant force which governs the student's progress and ability to learn is

1—motivation.
2—perception.
3—insight.
4—physical organism.

APPENDIX 2

ABBREVIATIONS

The abbreviations listed below are used to identify the aircraft categories associated with each test question listed in Appendix 1.

ALL — All Aircraft (Excludes Military Competence)
AIR — Airplane
RTC — Rotorcraft*
HLC — Helicopter
GYR — Gyroplane
PWR — Powered Aircraft**
GLI — Glider
HBL — Hot Air Balloon
GBL — Gas Balloon
ARS — Airship
LTA — Lighter–Than–Air** *
MIL — Military Competence

*RTC applies to both helicopter and gyroplane.
**PWR applies to airplane, rotorcraft, and airship.
***LTA applies to hot air balloon, gas balloon, and airship.

GOVERNMENT PUBLICATIONS

The following is a list of government publications which should be useful when preparing for the written examinations contained in this book:

Aeronautical Charts
Airman's Information Manual
Airport/Facility Directory
Notices to Airmen (Class II)
Federal Aviation Regulations
VFR Pilot Exam–O–Grams
National Transportation Safety Board Regulations
AC 00–6, Aviation Weather
AC 00–45, Aviation Weather Services
AC 00–50, Low Level Wind Shear
AC 20–32, Carbon Monoxide Contamination in Aircraft
AC 61–13, Basic Helicopter Handbook
AC 61–21, Flight Training Handbook
AC 61–23, Pilot's Handbook of Aeronautical Knowledge
AC 67–2, Medical Handbook for Pilots
AC 90–48, Pilot's Role in Collision Avoidance
AC 91–13, Cold Weather Operating of Aircraft
AC 91–23, Pilot's Weight and Balance Handbook
AC 91–33, Use of Alternate Grades of Aviation Gasoline

AC 00–2, Advisory Circular Checklist, explains how to obtain the above mentioned advisory circulars. You may request to be placed on the mailing list from the following office:

U.S. Department of Transportation
Distribution Requirements Section, M–494.1
Washington, D.C. 20590

FAA–APA–PG–7, Guide to Federal Aviation Administration Publications, is another useful phamplet containing all FAA publications and may be ordered from the following office:

Administration Publications
U.S. Department of Transportation
Subsequent Distribution Unit, M–494.3
Washington, D.C. 20590

Other sources of instructional material produced commercially may be obtained from various bookstores or fixed–base operators engaged in flight training. For subject areas where government publications have limited study material for certain categories of aircraft, commercially produced publications may be desirable.

AIRCRAFT CATEGORIES

To determine the applicable aircraft category for each question, refer to the question number in the following list.

Item	*Aircraft*	*Item*	*Aircraft*	*Item*	*Aircraft*	*Item*	*Aircraft*
2001.	AIR	**2039.**	AIR	**2077.**	AIR	**2115.**	AIR
2002.	AIR	**2040.**	AIR	**2078.**	AIR	**2116.**	AIR
2003.	AIR	**2041.**	AIR	**2079.**	AIR	**2117.**	AIR
2004.	AIR	**2042.**	ALL, MIL	**2080.**	AIR	**2118.**	AIR
2005.	AIR	**2043.**	AIR	**2081.**	AIR	**2119.**	AIR
2006.	AIR	**2044.**	AIR	**2082.**	AIR	**2120.**	AIR
2007.	AIR	**2045.**	AIR	**2083.**	AIR, HLC	**2121.**	AIR
2008.	AIR	**2046.**	AIR	**2084.**	AIR	**2122.**	AIR
2009.	AIR	**2047.**	AIR	**2085.**	AIR	**2123.**	AIR
2010.	AIR	**2048.**	AIR	**2086.**	AIR	**2124.**	AIR
2011.	AIR, GLI	**2049.**	AIR, GLI	**2087.**	AIR	**2125.**	AIR
2012.	AIR	**2050.**	AIR	**2088.**	AIR	**2126.**	AIR
2013.	AIR, GLI	**2051.**	AIR	**2089.**	AIR	**2127.**	AIR
2014.	AIR	**2052.**	AIR	**2090.**	AIR	**2128.**	AIR
2015.	AIR	**2053.**	AIR	**2091.**	AIR	**2129.**	PWR, GLI
2016.	AIR	**2054.**	AIR	**2092.**	AIR, RTC	**2130.**	AIR
2017.	AIR, GLI	**2055.**	AIR	**2093.**	AIR	**2131.**	PWR
2018.	AIR, GLI	**2056.**	AIR, GLI	**2094.**	AIR	**2132.**	PWR
2019.	AIR	**2057.**	AIR	**2095.**	AIR	**2133.**	AIR
2020.	AIR	**2058.**	AIR, GLI	**2096.**	AIR	**2134.**	AIR
2021.	AIR	**2059.**	AIR, GLI	**2097.**	GLI	**2135.**	AIR
2022.	AIR	**2060.**	AIR	**2098.**	AIR	**2136.**	AIR
2023.	AIR	**2061.**	AIR	**2099.**	AIR	**2137.**	AIR
2024.	AIR	**2062.**	AIR	**2100.**	AIR	**2138.**	AIR
2025.	AIR	**2063.**	AIR	**2101.**	AIR	**2139.**	AIR
2026.	AIR	**2064.**	AIR	**2102.**	AIR	**2140.**	AIR
2027.	AIR	**2065.**	AIR, GLI	**2103.**	AIR	**2141.**	AIR
2028.	AIR	**2066.**	AIR	**2104.**	AIR	**2142.**	AIR
2029.	AIR	**2067.**	AIR	**2105.**	AIR	**2143.**	AIR
2030.	AIR	**2068.**	AIR	**2106.**	AIR	**2144.**	AIR
2031.	AIR	**2069.**	AIR	**2107.**	AIR	**2145.**	AIR
2032.	AIR	**2070.**	AIR	**2108.**	AIR	**2146.**	PWR
2033.	AIR	**2071.**	AIR	**2109.**	AIR	**2147.**	AIR, RTC
2034.	AIR	**2072.**	ALL	**2110.**	AIR	**2148.**	AIR
2035.	AIR	**2073.**	AIR	**2111.**	GLI	**2149.**	AIR
2036.	AIR	**2074.**	AIR	**2112.**	GLI	**2150.**	AIR
2037.	AIR	**2075.**	AIR	**2113.**	GLI	**2151.**	AIR
2038.	AIR	**2076.**	AIR	**2114.**	AIR	**2152.**	AIR

Item	*Aircraft*	*Item*	*Aircraft*	*Item*	*Aircraft*	*Item*	*Aircraft*
2153.	PWR, GLI	**2195.**	AIR	**2237.**	AIR	**2279.**	PWR, GLI
2154.	AIR	**2196.**	AIR, HLC	**2238.**	AIR	**2280.**	AIR
2155.	PWR, GLI	**2197.**	AIR, HLC	**2239.**	AIR	**2281.**	AIR
2156.	PWR, GLI	**2198.**	AIR	**2240.**	AIR	**2282.**	AIR
2157.	AIR	**2199.**	AIR	**2241.**	AIR	**2283.**	AIR
2158.	AIR	**2200.**	AIR	**2242.**	AIR	**2284.**	AIR
2159.	PWR	**2201.**	AIR	**2243.**	AIR	**2285.**	AIR
2160.	AIR	**2202.**	AIR	**2244.**	AIR	**2286.**	AIR
2161.	AIR, RTC	**2203.**	AIR	**2245.**	AIR	**2287.**	AIR
2162.	PWR	**2204.**	AIR	**2246.**	AIR	**2288.**	AIR
2163.	AIR	**2205.**	AIR	**2247.**	AIR	**2289.**	AIR
2164.	AIR	**2206.**	AIR	**2248.**	AIR	**2290.**	AIR
2165.	AIR	**2207.**	AIR	**2249.**	AIR	**2291.**	AIR
2166.	AIR	**2208.**	AIR	**2250.**	AIR	**2292.**	AIR
2167.	AIR	**2209.**	AIR	**2251.**	AIR	**2293.**	AIR
2168.	AIR	**2210.**	AIR	**2252.**	AIR	**2294.**	AIR
2169.	AIR	**2211.**	AIR	**2253.**	AIR	**2295.**	AIR
2170.	ALL	**2212.**	AIR	**2254.**	AIR	**2296.**	AIR
2171.	AIR	**2213.**	AIR	**2255.**	AIR	**2297.**	AIR
2172.	AIR	**2214.**	AIR	**2256.**	AIR	**2298.**	AIR
2173.	AIR	**2215.**	AIR	**2257.**	AIR	**2299.**	AIR
2174.	AIR	**2216.**	AIR	**2258.**	AIR	**2300.**	AIR
2175.	AIR	**2217.**	AIR	**2259.**	AIR	**2301.**	AIR
2176.	AIR	**2218.**	AIR	**2260.**	AIR	**2302.**	AIR
2177.	AIR	**2219.**	AIR	**2261.**	AIR	**2303.**	AIR
2178.	ALL, MIL	**2220.**	AIR	**2262.**	AIR	**2304.**	AIR
2179.	ALL, MIL	**2221.**	AIR	**2263.**	AIR	**2305.**	AIR
2180.	ALL, MIL	**2222.**	AIR	**2264.**	AIR	**2306.**	AIR
2181.	AIR	**2223.**	AIR	**2265.**	AIR	**2307.**	AIR
2182.	AIR	**2224.**	AIR	**2266.**	AIR	**2308.**	AIR
2183.	PWR	**2225.**	AIR	**2267.**	AIR	**2309.**	AIR
2184.	AIR	**2226.**	AIR	**2268.**	AIR	**2310.**	AIR
2185.	AIR	**2227.**	AIR	**2269.**	AIR	**2311.**	AIR
2186.	AIR	**2228.**	AIR	**2270.**	AIR	**2312.**	AIR
2187.	PWR, HBL, GBL	**2229.**	AIR	**2271.**	AIR	**2313.**	AIR
2188.	ALL, MIL	**2230.**	AIR	**2272.**	AIR	**2314.**	AIR
2189.	ALL, MIL	**2231.**	AIR	**2273.**	AIR	**2315.**	AIR
2190.	ALL, MIL	**2232.**	AIR	**2274.**	AIR	**2316.**	AIR
2191.	ALL, MIL	**2233.**	AIR	**2275.**	AIR	**2317.**	AIR
2192.	ALL, MIL	**2234.**	AIR	**2276.**	AIR	**2318.**	AIR
2193.	ALL, MIL	**2235.**	AIR	**2277.**	ARS	**2319.**	AIR
2194.	AIR	**2236.**	AIR	**2278.**	ARS	**2320.**	AIR

Item	Aircraft
2321.	PWR
2322.	AIR
2323.	PWR
2324.	AIR
2325.	AIR
2326.	HLC
2327.	HLC
2328.	AIR
2329.	AIR
2330.	AIR
2331.	AIR
2332.	AIR, RTC
2333.	HLC
2334.	AIR
2335.	AIR
2336.	AIR
2337.	AIR
2338.	AIR
2339.	AIR
2340.	PWR
2341.	AIR
2342.	PWR
2343.	PWR
2344.	PWR
2345.	PWR
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2371.	ALL, MIL
2372.	AIR
2373.	AIR
2374.	ALL, MIL
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2382.	PWR
2383.	PWR
2384.	PWR
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2394.	HLC
2395.	PWR
2396.	PWR
2397.	PWR
2398.	AIR
2399.	PWR
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2404.	AIR
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2407.	AIR, HLC, ARS
2408.	AIR, HLC, ARS
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2412.	AIR, HLC, ARS
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2419.	AIR
2420.	AIR
2421.	AIR
2422.	GYR
2423.	AIR
2424.	HLC
2425.	HLC
2426.	AIR, RTC
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Item	Aircraft
2489.	AIR
2490.	AIR
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2493.	AIR
2494.	AIR
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2496.	AIR, HLC, ARS, MIL
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2501.	AIR
2502.	AIR, MIL
2503.	AIR, MIL
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2505.	HLC
2506.	HLC
2507.	HLC
2508.	HLC
2509.	HLC
2510.	HLC
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2512.	HLC
2513.	HLC
2514.	HLC
2515.	HLC
2516.	HLC
2517.	HLC
2518.	HLC
2519.	HLC
2520.	HLC
2521.	GYR
2522.	HLC
2523.	HLC
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2566.	RTC
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2595.	GYR
2596.	GYR
2597.	GYR
2598.	GYR
2599.	GYR
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2601.	HLC
2602.	HLC
2603.	GYR
2604.	GYR
2605.	GLI
2606.	GLI
2607.	GLI
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2655.	GIL
2656.	GLI

Item	Aircraft
2657.	GLI
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2698.	GLI
2699.	GLI
2700.	GLI
2701.	GBL
2702.	HBL
2703.	HBL
2704.	HBL, GBL
2705.	HBL
2706.	HBL, GBL
2707.	HBL
2708.	HBL
2709.	HBL
2710.	HBL
2711.	GBL
2712.	GBL, HBL
2713.	HBL
2714.	HBL
2715.	HBL
2716.	HBL
2717.	HBL
2718.	HBL
2719.	HBL
2720.	HBL, GBL
2721.	HBL, GBL
2722.	HBL
2723.	HBL, GBL
2724.	HBL, GBL
2725.	GBL
2726.	GBL
2727.	GBL
2728.	HBL
2729.	HBL, GBL
2730.	HBL
2731.	HBL, GBL
2732.	HBL
2733.	HBL
2734.	HBL, GBL
2735.	HBL
2736.	HBL
2737.	HBL
2738.	HBL
2739.	HBL
2740.	HBL
2741.	HBL
2742.	HBL, GBL
2743.	HBL, GBL
2744.	HBL, GBL
2745.	HBL, GBL
2746.	HBL, GBL
2747.	HBL, GBL
2748.	HBL, GBL
2749.	HBL, GBL
2750.	HBL
2751.	HBL
2752.	HBL
2753.	HBL, GBL
2754.	HBL, GBL
2755.	HBL, GBL
2756.	ARS
2757.	ARS
2758.	ARS
2759.	ARS
2760.	ARS
2761.	ARS
2762.	ARS
2763.	ARS
2764.	ARS
2765.	ARS
2766.	ARS
2767.	ARS
2768.	ARS
2769.	ARS
2770.	ARS
2771.	ARS
2772.	ARS
2773.	ARS
2774.	ARS
2775.	ARS
2776.	AIR, HLC, GLI
2777.	AIR, HLC, GLI
2778.	AIR, HLC, GLI
2779.	AIR, HLC, GLI
2780.	AIR, ARS
2781.	PWR, MIL
2782.	PWR, MIL
2783.	PWR, MIL
2784.	ALL, MIL
2785.	ALL, MIL
2786.	ALL, MIL
2787.	ALL, MIL
2788.	ARS
2789.	ALL, MIL
2790.	ALL, MIL
2791.	ALL, MIL
2792.	ALL, MIL
2793.	ALL, MIL
2794.	AIR
2795.	ALL, MIL
2796.	ALL, MIL
2797.	AIR
2798.	ALL, MIL
2799.	AIR, ARS, MIL
2800.	ALL, MIL
2801.	ALL, MIL
2802.	ALL, MIL
2803.	GBL, HBL, GLI
2804.	GBL, HBL, GLI
2805.	AIR, GLI, MIL
2806.	ALL, MIL
2807.	ALL, MIL
2808.	ALL, MIL
2809.	ALL, MIL
2810.	ALL, MIL
2811.	ALL, MIL
2812.	ALL, MIL
2813.	ALL, MIL
2814.	ALL, MIL
2815.	ALL, MIL
2816.	ALL, MIL
2817.	ALL, MIL
2818.	ALL, MIL
2819.	ALL, MIL
2820.	ALL, MIL
2821.	ALL, MIL
2822.	ALL, MIL
2823.	ALL, MIL
2824.	ALL, MIL

Item	Aircraft
2825.	ALL, MIL
2826.	ALL, MIL
2827.	ALL, MIL
2828.	ALL, MIL
2829.	ALL, MIL
2830.	ALL, MIL
2831.	ALL, MIL
2832.	ALL, MIL
2833.	ALL, MIL
2834.	ALL, MIL
2835.	AIR
2836.	AIR, MIL
2837.	AIR, MIL
2838.	AIR, MIL
2839.	AIR, MIL
2840.	AIR
2841.	AIR
2842.	AIR
2843.	AIR, MIL
2844.	ALL, MIL
2845.	ALL, MIL
2846.	ALL, MIL
2847.	ALL, MIL
2848.	AIR
2849.	ALL, MIL
2850.	ALL, MIL
2851.	AIR, ARS, MIL
2852.	ALL, MIL
2853.	AIR, MIL
2854.	ALL, MIL
2855.	ALL, MIL
2856.	ALL, MIL
2857.	ALL, MIL
2858.	ALL, MIL
2859.	AIR
2860.	AIR
2861.	AIR
2862.	AIR
2863.	ALL, MIL
2864.	ALL, MIL
2865.	ALL, MIL
2866.	AIR, MIL
2867.	AIR, MIL
2868.	AIR
2869.	AIR
2870.	AIR
2871.	AIR, MIL
2872.	AIR, MIL
2873.	AIR
2874.	AIR
2875.	AIR
2876.	AIR
2877.	AIR
2878.	AIR
2879.	AIR, GLI
2880.	AIR, MIL
2881.	AIR, MIL
2882.	AIR
2883.	AIR
2884.	AIR
2885.	AIR
2886.	AIR
2887.	ALL, MIL
2888.	ALL, MIL
2889.	ALL, MIL
2890.	ALL, MIL
2891.	AIR
2892.	ALL, MIL
2893.	AIR, ARS, MIL
2894.	AIR, MIL
2895.	AIR, MIL
2896.	ALL, MIL
2897.	AIR
2898.	AIR
2899.	AIR
2900.	AIR
2901.	AIR
2902.	AIR
2903.	AIR
2904.	AIR, GYR, ARS, MIL
2905.	ALL, MIL
2906.	AIR, MIL
2907.	AIR
2908.	AIR
2909.	AIR, RTC, MIL
2910.	AIR, HLC, MIL
2911.	AIR, RTC, MIL
2912.	AIR, RTC, MIL
2913.	AIR
2914.	AIR, MIL
2915.	ARS
2916.	ARS
2917.	ARS
2918.	ARS
2919.	AIR, MIL
2920.	AIR, MIL
2921.	ALL, MIL
2922.	ARS
2923.	AIR, MIL
2924.	AIR, MIL
2925.	AIR, RTC, MIL
2926.	ARS
2927.	AIR, MIL
2928.	AIR, MIL
2929.	PWR, GLI, MIL
2930.	AIR, MIL
2931.	ALL, MIL
2932.	AIR, MIL
2933.	AIR, ARS
2934.	AIR, MIL
2935.	AIR, MIL
2936.	ALL, MIL
2937.	ALL, MIL
2938.	AIR, MIL
2939.	AIR, MIL
2940.	AIR, MIL
2941.	AIR, MIL
2942.	AIR, MIL
2943.	AIR, MIL
2944.	AIR, HLC, MIL
2945.	ALL, MIL
2946.	ALL, MIL
2947.	ALL, MIL
2948.	AIR, RTC, MIL
2949.	AIR, MIL
2950.	AIR, MIL
2951.	AIR
2952.	AIR, MIL
2953.	AIR, MIL
2954.	AIR, MIL
2955.	AIR, HLC
2956.	AIR, HLC
2957.	AIR, HLC
2958.	AIR
2959.	AIR
2960.	AIR
2961.	AIR
2962.	AIR, MIL
2963.	AIR, MIL
2964.	AIR, MIL
2965.	AIR
2966.	AIR
2967.	AIR, MIL
2968.	ARS
2969.	ALL, MIL
2970.	GYR
2971.	HBL, GBL
2972.	HLC
2973.	AIR
2974.	AIR
2975.	AIR
2976.	ARS
2977.	AIR, MIL
2978.	AIR, MIL
2979.	AIR, MIL
2980.	AIR, MIL
2981.	AIR
2982.	AIR
2983.	AIR, HLC
2984.	AIR, HLC
2985.	AIR, MIL
2986.	AIR
2987.	AIR, MIL
2988.	ARS
2989.	AIR
2990.	GLI
2991.	GLI
2992.	AIR, MIL

Item	Aircraft
2993.	GBL, HBL
2994.	AIR, ARS, MIL
2995.	AIR, ARS, MIL
2996.	AIR, ARS, MIL
2997.	GLI
2998.	AIR
2999.	HLC
3000.	AIR, MIL
3001.	AIR
3002.	AIR, MIL
3003.	AIR, MIL
3004.	AIR
3005.	HLC
3006.	AIR
3007.	AIR, MIL
3008.	AIR
3009.	AIR
3010.	ALL, MIL
3011.	ALL, MIL
3012.	HBL, GBL
3013.	ALL, MIL
3014.	GLI
3015.	ARS
3016.	ARS
3017.	ALL, MIL
3018.	ALL, MIL
3019.	ALL, MIL
3020.	ALL, MIL
3021.	AIR, RTC, MIL
3022.	GYR
3023.	AIR
3024.	AIR
3025.	AIR
3026.	AIR
3027.	HLC
3028.	GLI
3029.	ARS
3030.	AIR
3031.	AIR, RTC, MIL
3032.	AIR, RTC, MIL
3033.	AIR
3034.	AIR, RTC
3035.	AIR, RTC
3036.	AIR, RTC, MIL
3037.	AIR, MIL
3038.	AIR, MIL
3039.	GLI
3040.	AIR
3041.	PWR, GLI, MIL
3042.	GLI, GBL, MIL
3043.	GLI
3044.	GLI
3045.	AIR, HLC
3046.	AIR, HLC, MIL
3047.	HLC
3048.	AIR
3049.	RTC
3050.	AIR
3051.	AIR, MIL
3052.	AIR
3053.	HLC
3054.	HLC
3055.	AIR, MIL
3056.	ARS
3057.	AIR, HLC, MIL
3058.	AIR, HLC, MIL
3059.	AIR, HLC, MIL
3060.	ARS
3061.	ALL, MIL
3062.	AIR, HLC, MIL
3063.	PWR, MIL
3064.	AIR, MIL
3065.	AIR
3066.	HLC
3067.	AIR
3068.	AIR
3069.	AIR, HLC, MIL
3070.	AIR
3071.	HLC
3072.	AIR
3073.	HLC
3074.	AIR, MIL
3075.	HBL, GBL
3076.	HBL, GBL
3077.	ALL, MIL
3078.	AIR, HLC, ARS, MIL
3079.	AIR, MIL
3080.	AIR
3081.	AIR
3082.	AIR
3083.	AIR
3084.	AIR
3085.	AIR
3086.	AIR, HLC
3087.	AIR
3088.	AIR
3089.	AIR
3090.	AIR
3091.	AIR
3092.	AIR
3093.	AIR
3094.	AIR
3095.	AIR
3096.	AIR
3097.	AIR
3098.	AIR
3099.	AIR
3100.	AIR
3101.	AIR
3102.	AIR
3103.	AIR
3104.	ALL, MIL
3105.	AIR, HLC, MIL
3106.	AIR, RTC, MIL
3107.	AIR
3108.	HBL, GBL
3109.	HBL, GBL
3110.	HBL, GBL
3111.	HBL, GBL
3112.	LTA
3113.	AIR
3114.	AIR, HLC
3115.	ALL, MIL
3116.	ALL, MIL
3117.	AIR
3118.	AIR, MIL
3119.	AIR, MIL
3120.	GBL, HBL
3121.	AIR, MIL
3122.	ALL, MIL
3123.	ALL, MIL
3124.	AIR, RTC
3125.	PWR, MIL
3126.	AIR, RTC, MIL
3127.	AIR, RTC, MIL
3128.	ALL, MIL
3129.	GLI
3130.	AIR, RTC, MIL
3131.	ALL, MIL
3132.	AIR
3133.	AIR
3134.	AIR
3135.	ALL, MIL
3136.	ALL, MIL
3137.	GYR
3138.	ALL, MIL
3139.	ALL, MIL
3140.	ALL, MIL
3141.	GBL, HBL
3142.	AIR
3143.	GLI
3144.	HLC
3145.	HLC
3146.	ARS
3147.	ARS
3148.	GBL, HBL
3149.	GBL, HBL
3150.	ALL, MIL
3151.	GLI
3152.	GLI
3153.	AIR
3154.	AIR
3155.	AIR
3156.	AIR
3157.	GLI
3158.	AIR
3159.	GBL, HBL
3160.	AIR

Item	*Aircraft*
3161.	AIR
3162.	AIR
3163.	AIR
3164.	AIR
3165.	AIR
3166.	ALL, MIL
3167.	AIR
3168.	AIR
3169.	AIR, HLC
3170.	AIR, HLC
3171.	ALL, MIL
3172.	AIR
3173.	ALL, MIL
3174.	ALL, MIL
3175.	AIR
3176.	PWR, GLI, MIL
3177.	AIR
3178.	AIR, RTC
3179.	ALL, MIL
3180.	AIR
3181.	AIR
3182.	AIR
3183.	ALL, MIL
3184.	ALL, MIL
3185.	LTA
3186.	LTA
3187.	LTA
3188.	LTA
3189.	LTA
3190.	LTA
3191.	LTA
3192.	LTA
3193.	LTA
3194.	LTA
3195.	LTA
3196.	LTA
3197.	LTA
3198.	LTA
3199.	LTA
3200.	LTA